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# The JOURNAL OF RADIOLOGY

*Omaha, Nebraska*

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## Do Roentgen Rays Cause an Indirect Stimulation?\*

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DISCUSSIONS on the subject of the direct stimulative effects of roentgen rays have nearly all tended to detract from this idea. There is now a quite general agreement with Pordes that the roentgen rays damage the cells which they strike, out of which action several therapeutic effects arise in consecutive order. There is also, nearly everywhere, a defection from the assumption, formerly widely circulated, that those cells which are struck by the roentgen rays are themselves directly brought to a condition of heightened activity or increased growth. In short, one now assumes that in the case of the roentgen rays there is no primary stimulation, in the sense of increased activity. The former assumption was dropped because the entire body of supporting evidence turned out to be false. Not one instance was found in which the growth of a carcinoma was demonstrably increased following exposure to the rays, and all careful comparative attempts at exposing one part of a tumor while shielding another part were negative or showed just the opposite. Faint sprouts, which are supposed to grow more rapidly following irradiation, showed on investigation of large numbers (Schwarz and Czepa) that the weakly irradiated grew just as rapidly as those that were not exposed, and that the strongly exposed grew more slowly. All other observations offered as proof of the "stimulative ac-

tion" were found also incapable of defense. The Arndt-Schulz law (all agents stimulate in small, damage in moderate, and kill every cell in large doses), the spread of which by quotation was greater than its support by proof, was reduced to its low level of validity inasmuch as the investigations directed upon it showed more exceptions than regular cases (Pordes). The idea of the stimulative action of small doses of roentgen rays is therefore not tenable. But this does not prevent its use when convenient to explain those actions of the roentgen rays which we do not as yet understand. As a matter of fact, the roentgen rays damage every cell, though this damage may be slight, depending on the dose and the individual sensitiveness. And this damage, intelligently produced, has a therapeutic effect in favorable cases, due to the fact that it is the noxious cells taking part in the battle being waged in the tissues that are damaged. Therein lies the essence of therapeutic roentgen ray action.

The fact that an apparent "plus" sometimes follows the irradiation of healthy plant or animal organisms has as little significance with regard to a primary stimulative action as the growth in length of pale cellar-plants or the gigantic growth seen in young individuals following castration or pituitary disturbances.

But recently the following argument has appeared: When one observes the action of roentgen rays—apart from a consideration of

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department of roentgenology at this  
institution. He is an international  
authority on the subject of roent-  
genology and has contributed widely  
to medical literature in his chosen  
field.

their effects on tumors and in several other instances—there can really be no doubt that some promoting action is found here after all. It is of little importance to know how this comes to be, or that the expression "stimulative action" has now been introduced in place of "promoting effect": the fact remains that such is the action of roentgen rays. It is true that this may not be a direct stimulation inasmuch as the sensitive cells are first damaged by the rays; but it is rather an indirect stimulation since this damage produces secondary promoting effects. Continuing in their deductions, the authors frequently omit the qualifying term, "indirect," and finally come to feel justified in speaking of the "stimulative" action of roentgen rays.

And so we are now confronted by the following state of affairs: The roentgen rays strike all the cells in the irradiated area. The susceptible cells suffer a change in the form of damage which corresponds to their sensitivity, and this is the first, the primary, direct, or immediate roentgen effect, the only one which the rays themselves accomplish *in persona*. It is, therefore, neither a "promoting" nor a "stimulative" effect. But as a result of the first effect there is a secondary, indirect, or mediate one (possibly also a third and a fourth) which may be found in the same group of cells, in neighboring cells, or in some other part of the organism. This latter effect is beneficial and promotes the general health, and so deserves the designation (secondary, indirect, mediate) promoting or stimulative action. But I believe this deliberation to be worthless. What it accomplishes is merely to retain the expression "stimulative action" on behalf of its authors, which might be allowed were it not for the fact that the confusion of ideas resulting from its use becomes immeasurably great, especially when the qualifying terms, "direct" and "indirect," are omitted. But this cannot be sanctioned, especially since there is no real need for the

expression. There might have been a primary promoting action, and even now this question (which is true of every scientific question) is not finally settled, so that every contribution which bears details in support of a primary promoting action deserves the fullest consideration. But a study of this subject has until now resulted in an unfavorable decision. Any attempt to apply a common term to all secondary, mediate, or indirect beneficial effects of primary ray action is unnecessary, for these are the healing actions, the therapeutic effects. The terms, "secondary healing effect" or "secondary therapeutic effect," not only designate exactly that which is meant, but designate it even better than the expression, "indirect stimulative action." The latter is too broad and manifestly not the same as "healing effect," even though the definition of the authors tends in that direction. Healing effects are the purpose of our therapeutic efforts, which are multiform individually, collectively long since designated as therapeutic, exactly as in the whole of medical therapy. The roentgen rays have simple therapeutic actions which they exercise in two ways: (1) The primary, in which, for example, tumors are destroyed directly or sickly growths of hair are temporarily damaged—effects which are already well known. (2) Secondary, wherein, in the course of events, the primary immediate cell damage gives rise to mediate lesser effects which are not yet so well known; for example, leukocytes are destroyed, antitoxins are liberated from them, etc.

#### CONCLUSION

We can, therefore, divide the therapeutic effects into primary (direct or immediate) and secondary (indirect or mediate). It seems to me that there is no place for "stimulative action" of roentgen rays neither in the world of facts nor our imaginations, nor in our scientific vocabulary.

(Translated from the original German by Walter Wegner.)

## High Voltage Roentgen Ray Therapy in Gynecological Practice\*

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IT is interesting to digress from the frequently reported effects of radiation on malignant disease and consider the value of

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radium and x radiation in the larger field of gynecology.

For many years radium has proven an invaluable adjunct in the treatment of gyneco-

logical conditions, such as uterine fibroids, "myopathic" uterine hemorrhages, and dysmenorrhea. Fibroid tumors are peculiarly susceptible to the gamma rays<sup>1</sup>; the only alternatives are surgery, or expectant treatment when the symptoms are absent or negligible<sup>2</sup>. Surgery still has an extensive field in cases complicated by adnexal inflammatory disease, malignant fundus uteri or ovarian growths, or urgent pressure symptoms. With uncomplicated uterine fibroids radium has the immense advantage of yielding no operative mortality and of preserving the pelvic organs without mutilation. Menstruation can be conserved when desirable with younger patients and the growth satisfactorily removed by smaller doses. Even large fibroids can be made to disappear completely by radiation in over 50 per cent of cases<sup>3</sup>.

The advent of higher voltage roentgen ray machines, functioning at 200,000 or more volts, gave us another weapon to successfully combat uterine dysfunction. The x ray alone or in combination with radium yields excellent results in benign uterine bleeding<sup>4</sup>. Roentgen ray treatment alone is an invaluable measure when substantial quantities of radium are not available.

The Coolidge water cooled tube enables us to treat these cases with greater despatch, less discomfort and loss of time to the patients, and, most important of all, with elimination of much of the radiation-sickness so commonly encountered.

The immediate results of exposures with the higher intensity machine have been even better than those obtained with the hot cathode type<sup>5</sup>. Our own water cooled tube has only been in operation since October, 1924, and final results cannot be deduced; however, I am reporting two cases in which the immediate result was most gratifying.

#### TECHNIQUE

I have previously described our own installation and technique<sup>6</sup>. We use 240,000 volts and 40 milliamperes; the filtration consists of one millimeter of copper and one millimeter of aluminum, and the focal skin distance is 50 centimeters.

#### CASE REPORTS

**CASE NO. 1:** This patient is an obese colored woman, age 43, referred November 11th, 1923, from the Johns Hopkins Social Service Department for treatment of profuse menstrual periods of a year's duration. Her hemoglobin

on admission was 54 per cent. She was also suffering from diabetes and had been placed on a diet. Examination revealed a large multinodular tumor, evidently a fibroid, arising from the pelvis and extending up to a hand's breadth from the costal margin, occupying most of the lower half of the abdomen. The patient's poor general health contra-indicated operation or the intra-uterine application of radium.

On the day of admission an external pack of radium was applied, both ovarian regions being treated with a total of twenty gram-hours. This dosage usually diminishes the fibroid and establishes the menopause, except in the occasional intractable case. This tumor proved to be one of the resistant type, for examination on December 30th, 1923, disclosed no change in the growth and the patient stated that she had been bleeding since December 15th. Consequently, a massive external radium treatment was given, covering three pelvic areas with a total of twenty-seven gram-hours.

By April 6th, 1924, a marked change was noted. The fibroid had receded to just above the symphysis, and the patient menstruated irregularly and with scanty flow. June 29th, 1924, the patient felt perfectly well; the menstrual periods were irregular and only lasted one or two days. The fibroid rose four fingers' breadth above the symphysis and a small mass could be distinguished in the left pelvis—possibly an ovarian tumor, but probably a pedunculated fibroid. August 10th, 1924, a radium exposure of ten gram-hours was given over this mass in the left pelvis.

December 14th, 1924, the patient came in complaining of having menstruated freely from October 1st to October 8th, and from October 18th to October 29th. Palpation divulged that the fibroid had increased to two fingers' breadth below the umbilicus.

The tumor and resultant menorrhagia was evidently returning, so on December 15th, 1924, the high voltage x ray was used. The anterior and posterior pelvic fields were exposed over an area 20 by 20 centimeters, with practically an erythema dose, seven minutes' treatment to each.

December 31st, 1924, a marked reduction in the fibroid was noted, which was now the size of a three month's pregnancy. The patient's skin was a lighter shade than the usual

mahogany so the portals radiated could be outlined by the deep tanning which had resulted. The patient was rather weak and had suffered from anorexia, but had no vomiting subsequent to the treatment. Her hemoglobin had increased to 88 per cent.

February 25th, 1925, the patient returned, feeling splendidly. Her period in January lasted three days, and in February only one day. The size of the fibroid was unchanged. Her skin was still tanned from the x ray treatment.

When she visited the office on April 22nd, 1925, her general appearance was that of excellent health. She had no complaint. The fibroid had not increased in size. There had been no menstrual periods in March nor in April.

**CASE NO. 2:** November 21st, 1924, a colored woman, aged 43, was referred by the Johns Hopkins Social Service Department because she had severe cramp-like pains beginning the day before each menstrual period and continuing throughout the flow. Her periods were regular, twenty-eight days apart; the duration was four days, and the amount of flow was normal. This severe dysmenorrhea confined her to bed for several days of each period. Examination revealed normal pelvic organs. Because of the patient's age and her severe suffering x ray treatment was decided upon, with the view of stopping menstruation. On the day of admission one six-minute treatment was given over a 15 by 15 centimeter anterior pelvic field.

When the patient was next seen, January 15th, 1925, her periods had not stopped, but the dysmenorrhea was totally relieved. She was confined to bed only part of one day instead of several days as formerly. A deep tanning marked the site of radiation.

February 15th, 1925, she was again seen, and appeared perfectly well and had no complaint.

March 12th, 1925, the patient writes that her periods stopped in February and have not appeared since. She is perfectly comfortable.

#### CONCLUSIONS

In Case No. 1, a very large fibroid, causing severe menorrhagia, proved tractable to only

massive doses of radium applied externally. The tumor was controlled at first by the radium; later its renewed growth and activity were halted by fourteen minutes' exposure to the high voltage therapy. Here fourteen minutes' radiation effected as much as an enormous dosage of radium was able to accomplish.

In Case No. 2, six minutes' radiation relieved a severe dysmenorrhea and produced the menopause.

That treatments of such brief duration caused a skin reaction is not as noteworthy as the fact that they produced the desired effects in the tumor and the ovarian tissues; the higher voltage and greater intensity used markedly increased the depth dosage.

Certainly no definite conclusions can be drawn from only two cases recently treated; but there is much encouragement in these results and much expectation for future benefit in gynecological work from the application of high voltage x rays with the more powerful modern machines.

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## Mediastinal and Lung Tuberculosis\*

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THE disease, Tuberculosis of the Chest, is so old that it ever becomes new through the changing concepts of its physiology, diagnosis and treatment. The physician interested in this subject finds that the tuberculosis teaching which he received in his course of medical study, be it five or twenty-five years ago, is obsolete in many of its phases; if he does not continually modify and change his views and keep up with the newer researches in this age-old, ever-prevalent disease, he soon becomes a straggler in the rear of a rapidly advancing army of workers.

The following observations and deductions will attempt to show that tuberculosis in the chest begins in the mediastinum, spreads from there into the hilum of the lung, and thence *radially and peripherally* into the lung parenchyma of both sides. The writer will again stress the idea that an incipient case of pulmonary tuberculosis cannot be diagnosed by means of percussion and auscultation, and that, when a diagnosis of pulmonary tuberculosis *can* be made by these means, it is no longer incipient, but moderately advanced.

### MODE OF INFECTION

In deciding upon the mode of infection, the last word has not yet been said. In approximately the last thousand cases examined by the author, the family history and the personal history were carefully observed. Over 90 per cent of these histories showed that the mother was either definitely diagnosed as tuberculous, or that her symptoms were such as to make a guess at the diagnosis of tuberculosis a safe hazard. Often it was possible to trace the disease through three, four or five generations on the mother's side. Careful elicitation of the personal history, especially that of childhood, showed that by far the greatest majority of the cases began to have toxic symptoms before the tenth year of life, often they dated from the first or second year, although tuberculosis was usually not even thought of as the cause of these symptoms. In a majority of the cases, the mother either recovered or did not die until after she had reached middle life.

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Of the mothers who accompanied the cases that came for examination, whether the cases examined were children or adults, very few whose sputum was examined showed the tubercle bacillus in the sputum, although physical examination and the x ray plate showed many of them active at the time of examination. These mothers invariably showed findings of old, or active, lesions in their chests, even though many of them had raised large families and had had no serious breaks with tuberculosis.

There is no doubt that most of the infections come from the mother. The child is with her and is taken care of by her from birth. She hugs and kisses the child, holds it up in front of her face to talk to it, prepares its food and feeds it, and even—as is the custom among some nationalities—chews its food for

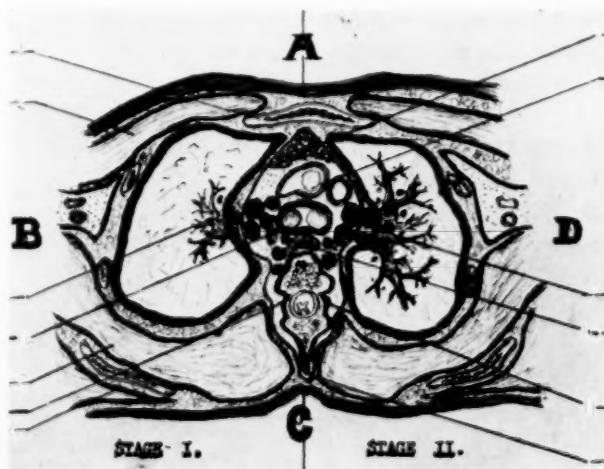


Fig. 1.—Cross section of thorax at beginning of the aortic arch.

Stage I—Stage I shows enlarged mediastinal glands and beginning fibrosis in the hilum (an incipient case). Auscultatory and percussion sounds at positions A and B are completely absorbed by intervening soft tissues. Only a position C, where there is a continuous bony path, can the sounds reach the surface (D'Espine's Sign).

Stage II—Stage II shows the fibrosis extended into the lung tissue sufficiently far so that the intervening soft tissues are insufficient to absorb the adventitious sounds, which are heard by the examiner as "auscultatory," or "percussion" sounds.

This stage, whether it be in the apex or lower, is no longer an "incipient case."

Key—1. Sternum; 2. Muscle; 3. Thickening of Hilus; 4. Bifurcation of Trachea; 5. Muscle; 6. Scapula; 7. Thymus gland; 8. Aortic Arch; 9. Enlarged glands; 10. Esophagus; 11. Vertebra; 12. Vertebral Spine.

it when it is being weaned. There is no doubt that, even though the tubercle bacilli may never be found in the sputum of the mother, they at some time or other get into her throat and mouth in every instance, and thus become potentially infective, especially when the child is so susceptible to any infection in the early years of its life. It is generally conceded among tuberculosis investigators that the mother's milk is not only not infective, but has some tuberculosis-resisting properties. With the child around the mother in the most susceptible time of its life—with hugging and kissing, intimate association and the droplet method of infection—no further search for the mode of infection is necessary.

Of the three types of infection: inhalation, ingestion and inoculation, the inhalation mode is considered the most probable and important in infection by tuberculosis (Fishberg). Our observations would indicate that perhaps the two, inhalation and ingestion, work together—the germs are received into the mouth and throat by inhalation (or by inoculation through kissing), and then infection induced by their being inhaled or ingested or, more than likely, both.

The idea of infection from the mother is borne out by another set of investigations: Theobald Smith, the British Royal Commission, William H. Park and the German Imperial Health Board have shown that 99 per cent of tuberculosis in adults and 85-90 per cent in children are due to the human type of the tubercle bacillus, while most of the bovine bacillus infections are of the bones and joints. Let it not be forgotten that occasionally a case is infected from a grandmother, aunt or nurse

who were tuberculous and cared for the patient in childhood.

#### PRIMARY SEAT OF INFECTION

Infection by tuberculosis comes as a result of the tubercle bacilli being inhaled or swallowed from the throat. In passing, let it be stated that tubercle bacillus have often been found in the throats of supposedly healthy individuals (N. W. Jones: Med. Rec. 58:285). No matter whether the bacilli are inhaled into the trachea and find lodgement in the peritracheal lymph glands at once, or whether they are first swallowed or drained into the mesenteric lymph glands whence they are carried to the mediastinum, into the pulmonary and tracheal lymph glands, the primary seat of infection is in these glands of the mediastinum. If the infection is not too massive, or if the resistance of the individual be great enough to resist its spread, the infection is confined to these glands; the bacilli are starved out over a period of years by the calcification of the glands in which they are lodged; and the process is arrested. But this arrestment is *not a matter of months, it is a matter of years*. Even a firmly calcified gland may contain virulent organisms for years (Fishberg).

#### SPREAD OF INFECTION

The tubercle bacillus acts as a foreign body in the tissues: the body defenses attempt to encapsulate it with fibrous tissue and lime deposit. In an active case, as the bacilli multiply and spread, the primarily infected glands of the lymphatic system are filled—the first line of defense proves inadequate. The bacilli overflow into the adjacent glands, and are followed by fibrosis and calcification. Gradually this extension carries the battle into the hilum

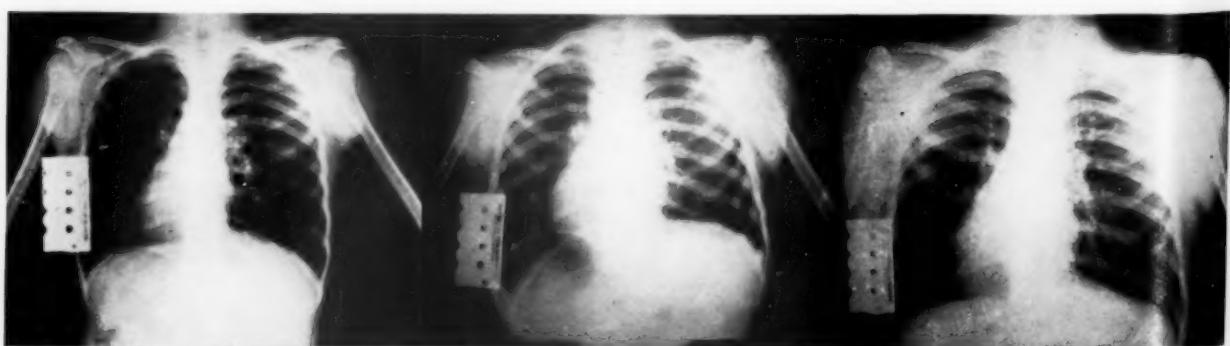


Fig. 2.—Age 11, female, twin. Beginning fibrosis in right and left hilus regions (left hilus partially obscured by heart shadow). Few light trabeculations extending upward into apices especially right, and a few into bases. Tendency toward drop-heart already appears. Afternoon temperature and high pulse.

Fig. 3.—Age 11, male, twin. Has been more active physically than his sister, correspondingly, the hilus shadows and sprays in apex and base are more pronounced, as is the toxic heart. Afternoon temperature and high pulse. Note the similarity in the pattern of the sprays of fibrous tissue on both sides.

Fig. 4.—Age 14, male, schoolboy. Increase in area and density of the hilar and apical shadows. Right apex beginning to become clouded with fibrosis. Marked toxic symptoms, afternoon temperature, rales in both hilar regions and in right apex. Physical findings are evident, percussion, auscultation. Toxic heart.

of the lung. Arrest may take place at any of the lines of defense, but if it does not, the lung parenchyma is more and more encroached upon. The defending fibrosis follows the invaders and forms radially branching trabeculations through the lung tissue, which progress farther and farther out until they reach the apices and bases of the lungs. In the beginning of this invasion, *the process of spread is bilateral and equal*, and not until later does the physics of the lung structure influence the spread more rapidly on one side than the other. In some cases the body does not seem to be able to deposit scar tissue rapidly enough to repair the inroads of the infection, and the whole tuberculous process becomes a soft, caseous mass which gives muffled physical signs. If destruction keeps up, sloughing and cavitation ensue.

In most cases tuberculosis is a slow, chronic process. It spreads slowly, and repair by the deposit of scar tissue is slow. In a usual case, a year's time shows only minute changes in the roentgenograms of the chest. The process usually goes on for from five to fifteen years from the time of infection before physical findings become evident.

#### PHYSICAL FINDINGS

The bugaboo of the present diagnosis of early pulmonary tuberculosis is the blind dependence placed upon actual physical findings—percussion and auscultation. Until these are placed in their proper nook in the diagnostic routine and the earlier signs and symptoms

given their proper significance, early diagnosis of pulmonary tuberculosis will never be made.

Percussion of the chest is based upon the difference in resonance of the tissues of various densities in the chest. In other words, the outlining of a tuberculous process depends upon the amount of fibrosis or caseation present. Auscultation depends likewise upon the increased intensity of the sound transmitted by the denser tuberculous areas, and also moisture, which is conspicuous by either its presence or absence. These adventitious sounds become evident to the examiner *only when they are transmitted through the chest wall*. The character of all the tissues intervening between the tuberculous process and the skin will affect the intensity of the transmitted sounds. The rarity of intervening tissues as well as density change the volume of the sound; a spongy, air-filled medium, such as the lung tissue, *does not transmit sound, but absorbs it*. Hence, there may be a definite tuberculous lesion so situated that it is surrounded by sound-absorbing lung tissue and give very faint diagnostic sounds, or none at all. Especially is this true of the primary lesions in the mediastinum.

The accompanying Figure 1 is a more or less schematic cross section of a chest. In Stage I (incipient case) the pathology is in the mediastinum and hilum. The diagnostic sounds cannot reach the surface at positions A and B, because they are absorbed at position A by the thymus gland, sternum, muscle and skin;

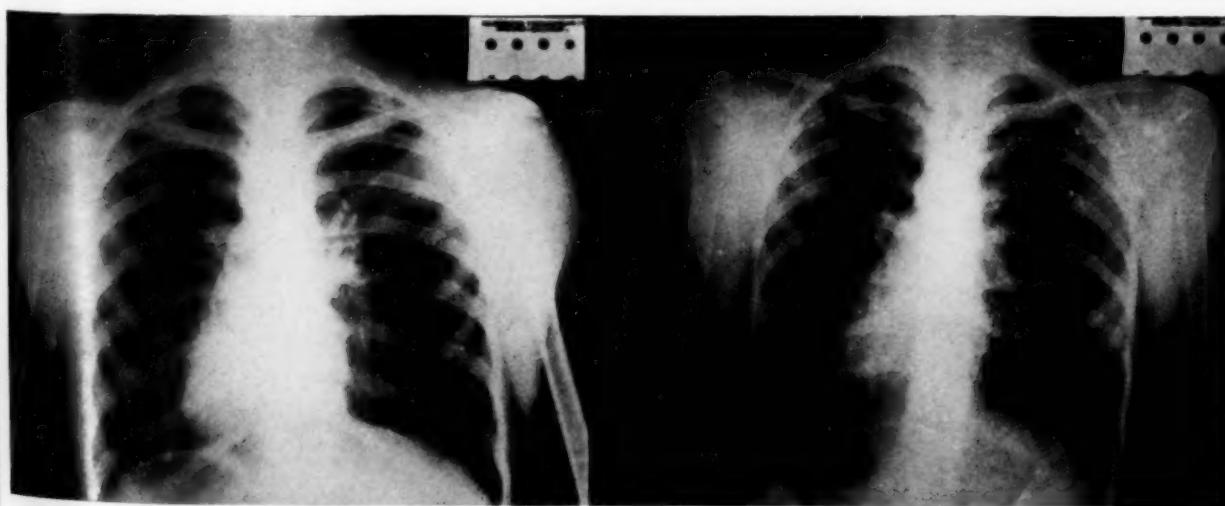


Fig. 5.—Age 17, female, schoolgirl. Hilar shadows are broader, more pronounced, and the trabeculations are spreading further out into the lung parenchyma, especially in the right apex where the fibrosis has begun to assume a fuzzy, cottony effect. The physical findings are more pronounced—vocal and tactile fremitus, prolonged expiration and rales. Hanging heart evident.

Fig. 6.—Age 19, female, university student, worked part of way through two years of school. Arborizations from hilar regions extend still further out into lung parenchyma, especially in right lung. The right apex shows many small areas of consolidation—"beading." Physical findings definitely more pronounced than in preceding cases.

nor at position B because of being surrounded by spongy lung tissue. Only at position C can the sounds come through, because the vertebra offers a continuous solid path of conduction for the sound waves by which they can reach the stethoscope or ear. This gives us D'Espine's Sign, which is so valuable in the diagnosis of tuberculosis in children. Only when the lesion becomes very massive or spreads through the lung parenchyma, whereby the intervening tissue is insufficient to deaden the vibrations before they reach the chest wall, will percussion and auscultation become evident. This condition is shown in Stage II, where the fibrosis has followed the infection which has broken into the lung tissue.

The idea is prevalent that tuberculosis begins in the apex, and usually in the right apex, and that, not until the lesion can be definitely demonstrated by physical findings, can the diagnosis of tuberculosis be made with assurance. Nothing could be more erroneous than this belief, for at least five, more usually ten or fifteen years of actual activity and spread have preceded this extension into the apex. As a matter of fact, it is true that physical findings usually first become evident in the apex, and more often in the right apex, but this is due to the anatomy of the chest. The right apex is closer to the surface of the chest wall than any other part of the lung. Elsewhere there is a thick layer of sound-deadening tissue intervening. As the fibrosis of the disease spreads radially and peripherally, it will

be heard where it comes closest to the body surface, and this is in the right apex, although the downward spread of the pathological process into the base of the lung is usually more massive than that into the apex. The axillæ (positions B and D) are the most distant from the lesion, and hence, the findings are here last and least discernible. The left apex, although relatively as close to the surface as the right, has the arch of the aorta and the heart itself to absorb the sounds, therefore findings become evident there later than in the corresponding position on the right. But, when physical findings become demonstrable in the right or left apex, the *tuberculous process is no longer incipient*.

Occasionally the aorta is surrounded by a mass of dense fibrous inflammatory tissue as a result of a tuberculous process. The mass forms a good sounding board and transmitting medium for the breath sounds or the rush of blood through the aortic arch. As the aorta distends and contracts, it may set this fibrous band to vibrating and thus simulate an organic heart murmur. Several cases have come to the writer's attention where such a murmur, along with an enlarged heart, toxic from the tuberculous process, had provoked a diagnosis of mitral stenosis. Upon recession of the toxemia and decrease in the size of the heart, the murmur gradually subsided.

#### THE IMPORTANCE OF THE ROENTGENOGRAM

It has been the writer's practice to take an

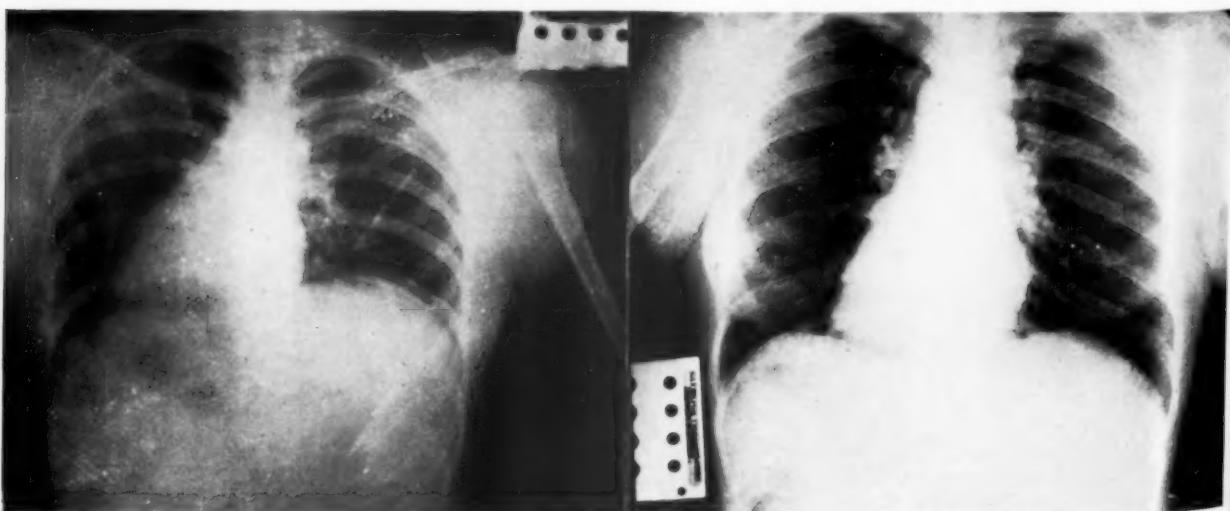


Fig. 7.—Age 23, female, married, one child 2 years old. While patient is overweight, she cannot stand exertion is shallow, nervous and has coughed for years. Physical findings are definite, but are muffled by heavy layer of subcutaneous fat. Note the heavy fibrosis of both hilar regions—indicating good healing power. Rales in right apex.

Fig. 8.—Age 43, female, mother of preceding cases. Good fibrosis, which has contracted into firm scar tissue, but has again begun to break down in the right apex, which shows diffusion and heading. Physical findings (percussion, auscultation) are very marked and definite, although the symptoms of toxicity are not nearly so marked as in the three youngest children, whose physical findings, on the other hand, are conspicuous by their almost total absence.

x ray plate of every chest that comes to him for diagnosis, and, insofar as he has been able, to plate the lungs of the entire family of the patient. In this way he has obtained a great many family series for study and comparison, from which some interesting deductions have been drawn.

First: X ray plates of the lungs are of more importance than physical findings, which stand second, in the hands of an experienced reader of chest plates, in early or incipient cases of tuberculosis.

Second: Each family series has its characteristic pattern of fibrosis, and all members of the family who show infection (and practically all of them do, although they may not show clinical manifestations of the disease) adhere to this pattern. This has an entirely logical explanation—with the same infecting strain acting upon the same flesh and blood, with the same anatomical characteristics, they should show the same mode of growth with the same defensive response.

Third: The roentgenogram shows a progression of the infection and protective fibrosis year by year as the members of more years are examined. This fibrosis is shown as always beginning in the hilum in the infants and children, and spreading peripherally and radially into the lung parenchyma in the older members of the family.

Fourth: The older members of the family, often having effected an arrestment of the disease years before, show a heavier fibrosis on the plate, and more intense physical findings in examination, with little or no toxic symptoms, while the younger members show little or no fibrosis outside of the hilum and very few or no physical findings on examination, but often an intense toxemia.

One of these family series is here reproduced. This family is intelligent, well educated and comes from the upper social stratum of life. The three youngest children and the

mother were patients at our institution for some months, where ample opportunity was given for repeated examination and study of the cases.

#### CONCLUSIONS

1. Infection by the tubercle bacillus comes most often from inhalation or ingestion or a combination of both. It is received in early childhood, most often from the mother, sometimes from a nurse or closely associated relative.
2. Instead of being infective to the baby, mother's milk possesses protective antibodies.
3. The primary seat of infection in pulmonary tuberculosis is in the lymph glands of the mediastinum, whence the infection spreads through the hilum of the lung, spreading radially and peripherally into the lung parenchyma. The infection is followed by defensive fibrosis.
4. Percussion and auscultation of the lungs depend upon the density of the reacting inflammatory tissue as well as upon the density and rarity of the natural tissues intervening between the lesion in the lung and the surface of the chest wall.
5. Infection comes first, fibrosis follows second, and physical findings come third.
6. When physical findings become demonstrable in the apex, the disease is no longer in the incipient stage.
7. When one of the parents, especially the mother, shows signs and symptoms of the disease, all of the children show evidence of infection, although they may not manifest the disease clinically.
8. The roentgenogram of the lungs is second in importance only to the complete history and should take precedence over physical findings in early cases.
9. There is a striking uniformity in the fibrosis pattern in all the chest plates of a family series of tuberculous patients.

## Skin Malignancies: Diagnosis and Treatment\*

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(From the Pittsburgh Skin and Cancer Foundation.)

IT would be presumptuous to appear before a body of medical men to talk on the subject which I selected, with the idea of saying some-

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thing that all of you have not known nor heard at some time or other. My attempt, however, may be worth your while, since it carries little beyond practical suggestions, which I obtained by following a fair number of cases afflicted with skin cancer.

## DEFINITION

## What is skin cancer?

Shall we accept the dogmatic textbook definition, which says: "Skin cancer or Epithelioma or Carcinoma Epitheliale in its strict dermatologic interpretation designates epithelial new growths, which develop from the epithelium of the epidermis or from glandular structure of the derma or true skin, and is characterized by destructive tendencies"? or shall we take an allegoric but highly descriptive definition, which would sound something like this:

Any living body is composed of myriads of individuals, whom we term cells, who are all endowed with certain definite characters and all of whom unite to form an association or a community, making their own activities and wishes subservient to the welfare of the union or community of which they are a part. Amongst the many millions of these inhabitants occasional uprisings or occasional obstreperous individuals are found, who do not approve of the methods, ways or policy of the entire community. These disturbers act like and are the supreme anarchists of the body economy. Becoming dissatisfied with their share or burden, they rebel and organize a group of their own, which instead of lending a helping hand to community affairs cause an uprising and destruction. They form a lawless body, which sooner or later destroys the entire organization.

I admit that is not a scientific explanation and that I may be censured for this lay explanation, but to me it defines malignancy in a functional way.

## CLASSIFICATION

Clinically we recognize both primary and secondary skin cancers; the latter invades the skin by extension from the neighboring or underlying organs or cancers in form of metastasis from distant organs. The purpose of my paper is to consider primary cancer only.

**PATHOLOGICAL.** From a pathological standpoint we recognize two definite types of Epitheliomate:

- I. The squamous or prickle cell type.
- II. The basal cell type.

I. *The squamous cell type* follows trauma or other chronic external irritation, or develops in old scars of lupus vulgaris or warts. It is the type which affects the mucosa of the lip and tongue.

Its histology demonstrates a down growth of epithelium with branching processes extending in various directions. Whirls of cornified epithelium are seen, which form a cell nest. The center of this cell nest is composed of hyalin, degenerated cells and cell debris, around which are concentric rings of cornified cells, occasional prickle cells, edematous corium, infiltration of plasma and lymphoid cells, which, together with the destroyed elastic tissue in the area of infiltration, constitutes the histologic picture.

II. *The basal cell type* usually originates from the basal cells of the epidermis.

The growth is composed of cylindrical processes, which progress laterally and downward. The cells composing these processes are oval or round with relatively large and deeply staining nuclei and small amount of protoplasm. These cells are closely packed and at

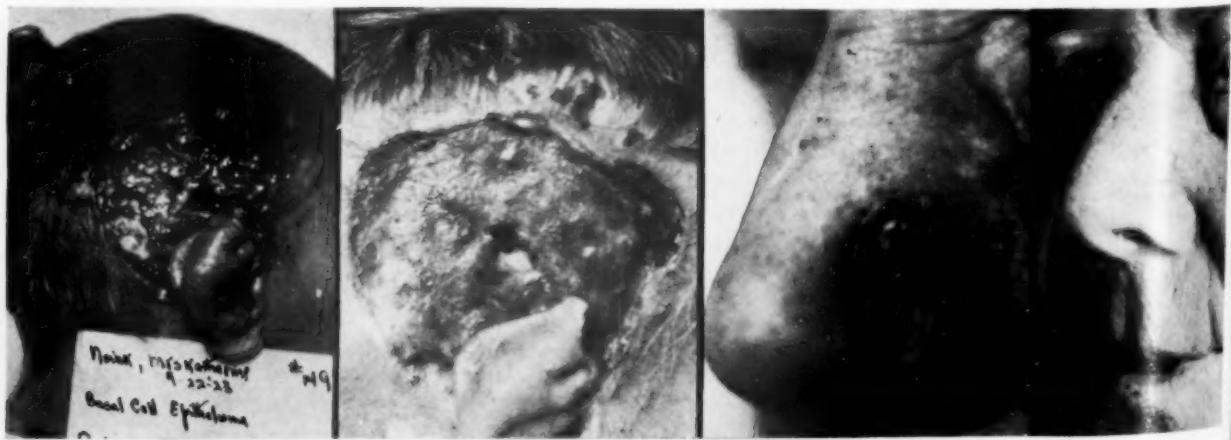


Fig. 1.—Mrs. K. N. Epithelioma of the scalp and ear.

Fig. 2.—Same patient as in figure 1, twenty weeks later, after four treatments each of four units of unfiltered x ray.

Fig. 3.—Mrs. B. Epithelioma of the nose.

Fig. 4.—Same patient as in figure 3, eight weeks after four units of unfiltered x ray.

times undergo cystic degeneration, producing cavities which contain fluid. Destruction of the surrounding tissue, although present, is not marked and the progress of this type is very slow.

**CLINICAL.** They may be divided clinically into:

- I. The Flat or Superficial.
- II. Deep or Nodular.
- III. Papillomatous or Fungoid variety.

I. *The Superficial type* occurs principally on the face, ears and hands. It begins in several forms.

1. It may begin as a thickened, reddened patch, which is covered with a slight scaling which increases in amount until a crust is formed. When this crust is removed a granulating ulcer is found, which slowly but gradually increases in size and depth.

2. It may begin as a small yellowish or whitish nodule, exhibiting dilated blood vessels, telangiectasia on its surface and slowly enlarging. Usually there are several of these nodules existing, which are somewhat grouped, and as they enlarge they usually coalesce to form a large node. These nodules become fissured and excoriated of their own accord or by trauma and soon develop a crust which again hides a granulating ulcer beneath. The crust falls off spontaneously or is removed and at each successive removal it enlarges in size and depth. The appearance of its shape depends on the coalescence of nodules and it may be round, oval or even crescentic, resembling a tertiary syphilitic lesion. Cicatrization is noted frequently in these cases, with the surrounding nodular waxy border.

The base of the ulcers varies with the size of the lesion, but it is always depressed and uneven, exhibiting areas of small cicatrization and brownish red, easily bleeding granulation. The border is elevated, indurated, irregularly indented and telangiectatic. The crust is brownish red, thick or may be glazed in appearance.

The types which fall into this group are:

- (1) Rodent Ulcer,  
(2) Morphea-like Epitheliomata,  
(3) Multiple Epitheliomata,

Basal  
Cell Type

II. *Deep or Nodular variety* may develop from the superficial type or as a firm pea-sized nodule beneath the skin. Gradually increasing, its surface is usually dark red, telangiectatic at first and soon breaks down, producing an ulcer whose floor is irregular, fun-

goid, bathed with a viscid or hemorrhagic fluid, the edge is undermined, thickened and indurated. This type extends rapidly both peripherally and deeply, causing rapid local destruction and general metastases, and is rapidly fatal.

III. *The Papillary variety* presents a cauliflower appearance, secretes foul-smelling viscid fluid and bleeds readily. The growth infiltrates the underlying structures quickly, and metastasizes, and is always fatal.

#### ETIOLOGY

The definite cause of epithelioma is of course not known, for what we know is purely theoretical. Since scientific investigation has been made the basis of theory and has been the only rightful standard bearer of progressive medicine, no reasonable explanation has been found to my knowledge of the origin of malignant growths nor any justifiable classification given of their relationship among other diseases. This etiological dilemma has unquestionably handicapped the progress in therapy.

Theoretical consideration of disease as to its etiology is a grave mistake, but I am going to commit it, since it gives an opportunity to those interested in this particular subject to act upon the suggestions outlined therein.

Basing my thoughts on the fact that nature operates along single laws of action and reaction, I have tried to place cancer within this contention.

The clew offers itself if certain regularities and certain characteristics of malignancies are analyzed. What are these characteristics?

I. That there are *certain locations*, which are much more frequently affected by malignancies than others (speaking of primary site of appearance). The face, the lower lip, the tongue, the stomach, the rectum, the breast, the cervix of the uterus, the prostate and the glans penis furnish by far the most frequent sites for the appearance of malignant growths. Naturally the question arises: why should the skin of the face be more frequently the site of cancer than the skin of the forearm, the stomach more frequently than the head of the pancreas, the tongue or the glans penis more frequently than the nervous tissue?—there must be a biological reason. The reason seems to be apparent enough, and has been the only consistent factor in the etiological speculation—it is trauma.

The organs mentioned by their location are more predisposed to trauma, than other parts of the body. They are subjected to more frequent mechanical, chemical, biochemical or physical blows than other organs.

Carrying this speculation further, we can say with little fear of contradiction that injury means cell destruction in the vast majority of instances. The biological reaction on the part of the body, which follows cell destruction, calls forth the mechanism of tissue repair.

Repair of tissue is fairly well understood. Its physiological pathology depends on the combined activity of the surrounding tissue cells, which throw out fibroblastic prolongations, and the activity of the blood and lymphatic circulation, which throw their component parts, red and white corpuscles, serum and wandering cells into the field of destruction. It is here where we must look, if logic is to be followed, for factors in etiology of malignancies. Tissue repair goes on more or less constantly in the body, and, therefore, it must be accepted as a physiological process. All physiological processes in the body are controlled by some biological product, whether this comes as a stimulus from a neuron or as a product of a ductless gland. Therefore, in tissue repair in addition to the ordinary cellular changes, changes of fibroblastic prolongation, in addition to leucocytic infiltration, there must be present a substance, the product of an internal secretory cell, which supervises or controls the process of repair—a substance whose influence matures the newly formed fibroblasts and whose influence stops the rebuilding process when the gap left by the destroyed cells is filled.

II. Let us go now to the second characteristic of malignancies and we find that *growth is pathognomonic of cancer*. The end result of this growth may appear differently in the various forms of malignancies, but the basic change is reproduction.

III. The third characteristic thing about malignancies is that they are *composed of ill-formed or premature cells*.

Growth and maturity of the body is acceptably controlled by the endocrine system—Gigantism, Acromegaly, Cretinism, Dystrophy Adiposo Genitalis, etc., are conclusively demonstrative of endocrine dyscrasias. Adolescence and maturity are the physiological manifestations of gonad activity and establishment of their stability.

Having then established the governing factors for growth of the body, is it not plausible to suppose that tissue repair is conducted under the influences of the same governing factors?

Permitting this as a hypothesis, that tissue repair depends on the known cellular changes plus the presence of a governing factor—the product of endocrine glands—which matures the newly formed cells and stops tissue repair when complete, let us see how this is applicable to the formation of malignancies.

If tissue repair takes place at a time when all the above described substances are present, the end result is satisfactory. If, however, the necessary biological formula is incomplete and if cell destruction, which produces the first stimulus for tissue repair, occurs at a time when the body lacks that hormone, that product of endocrine activity which governs the balance of newly formed cells, a new order

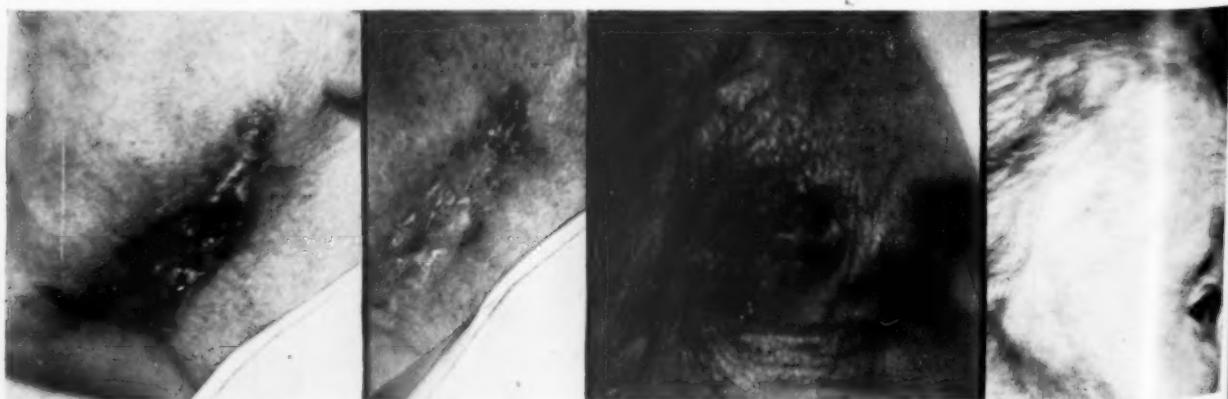


Fig. 5.—Mrs. C. Epithelioma at the left angle of the lower jaw.

Fig. 6.—Same patient as in figure 5, twelve weeks later, after three treatments each of four units of x ray.

Fig. 7.—Mrs. K. S. Epithelioma over the temporal region.

Fig. 8.—Same patient as in figure 7, four weeks later, after two treatments each of four units of unfiltered x ray.

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of things will arise. The product of this new order will be a cell, which is a separate unit, following its own laws and perpetuating itself once the impetus for growth has been permitted to carry itself away at the expense of the rest of the body economy.

IV. The fourth characteristic of malignancies is that *they occur most frequently after middle age of life*, in women at about menopause, at a time of life when endocrine unbalance is at its height, when the internal secretions of the body go through a marked and sharp readjustment.

By recapitulation the hypothesis established is that cancer originates at the site of damaged cells, where cell replacement is necessary and that this replacement occurs at a time when the body is lacking either permanently or temporarily in endocrine products, which may be termed as the governors of maturity.

To illustrate, let us consider the patients in whom skin cancer most frequently occur. The case of a smoker, the worker in tar and paraffin, the chimney sweep, the sailor exposed to wind and sun, the roentgen ray operator, the cases resulting in burns induced by Kongri (a portable fire box used by natives about Kashmir) infer long standing irritation.

Warts, nevi, lupus vulgaris, sebaceous cysts, wens occasionally transform into epithelioma.

Sears of syphilis, especially on the mucous and arsenical keratotic areas, may degenerate into epithelioma.

#### DIAGNOSIS

The diagnosis of skin cancer is facilitated if the following points are remembered:

I. The *age* of the patient, usually after 40 years.

II. The single *character* of the lesion.

III. *History* of progression.

IV. The *character* of the border:

1. Pearly.

2. Hard.

3. Elevated.

4. Indurated.

5. Telangiactatic.

V. The *scantiness* of *discharge*, which is viscous or hemorrhagic.

VI. Its *location*.

VII. In case of doubt, a *biopsy* for microscopic examination usually clears up the diagnosis.

#### DIFFERENTIAL DIAGNOSIS

There are six conditions with which epitheliomata are most frequently confused: Syphil-

itic ulcerations, lupus vulgaris, lupus erythematosus, birth marks, nevi, senile warts or Hunterian chancres.

I. Important points for differentiation from a tertiary syphilide are that *syphilitic ulcerations* are as a general rule:

1. Multiple.
2. Their shape is usually crescentic.
3. They are bathed in profuse purulent secretion.
4. There is a lack of telangiactasia.
5. The Wassermann and therapeutic tests are very helpful.

II. *Lupus vulgaris* occurs at an earlier age, is rather infrequent, and is composed of apple jelly like nodules or tubercles.

III. *Lupus erythematosus* is seldom ulcerative to the degree that we find in epithelioma. It covers a large, flat surface, has a characteristic scale, which is thin and hard to detach from the underlying erythematous surface and shows fine cigarette paper like scars through which the underlying blood vessels are freely visible.

IV. A *nevus* may undergo malignant degeneration, but it can be diagnosed by the history of its presence since birth.

V. A *senile wart or keratosis* is a premalignant structure, usually dark brown, waxy and shows no induration. Telangiactasia are always absent and the part may be somewhat itchy.

VI. *Hunterian chancres*, when they occur on the face past middle life, are hard to differentiate, except by dark field examination.

#### TREATMENT

Complete eradication of all cancer cells is the aim of treatment.

On account of a variable location of primary and secondary growths the method pursued to accomplish this is varied and usually more than one procedure is required in even individual patients. Even then, as you know, a great many times every effort fails.

The methods of treatment are:

I. *Surgery*.

II. *Electricity*.

III. The use of *radiotherapy*.

I. *Surgery*: If it were possible to remove with the knife all existing cancer cells, not only those which form the tumor, but also the ones which have spread beyond it, it would be the best form of treatment. At present it is being used with greater or lesser

success in some of the internal organs, the lip and the tongue.

However, a great danger lurks in this method, for it opens up channels by which loose cancer cells may be picked up, causing a rapid spread of the disease. It is impossible to know or to judge how far to cut and when to stop. This method is, therefore, available for a few confined cases of cancer.

To a much greater advantage surgery can be used as an accessory method. This consists in shutting off the blood supply to the tumor mass and actually starving out the newly forming cells, and incidentally stopping the carrying away of poisons, which originate in the tumor mass, from spreading into the system.

We are hopefully looking to a perfection of this accessory method.

**II. Electricity:** To obtain destruction of the tumor mass without opening up channels for its spread, without subjecting the patient to a great loss of blood, without the danger of infection, electricity is used in several forms.

Electricity may be applied either in the form of an actual cautery, when an electrically heated so-called knife is used to cut away the tumor, or by introducing the electrical current through a needle into the various parts of the tumor, withdrawing the water from the cells and killing it off by actually drying out or cooking the tumor, while it is in its host. This last method is termed desiccation.

### *III. The Utilization of Radiotherapy:*

**1. Roentgen Ray.** The direct application of roentgen rays or what is commonly known as x rays, if used in sufficient quantity, will kill off a living cell *in situ*.

As far as practical purposes are concerned, the x ray consists of three types of waves. These are designated according to the length of the wave which composes them, as: Alpha, beta and gamma ray.

The alpha and beta rays are longer than the gamma ray, and produce a burn more quickly; but they do not penetrate as deeply. The gamma ray is composed of very much shorter waves, and has a greater ability of penetration, causing more destruction of cell and less burn. It is the gamma ray, therefore, that would appear the logical one to use in the treatment of cancer. It has been repeatedly shown, and these results are being du-

plicated at the Pittsburgh Skin and Cancer Foundation, that skin cancers can be treated with the use of ordinary x rays, produced by a standard type of machine, the exact dosage being very definite. In order to reach a deep seated cancer, which is far below the skin, an apparatus has to be found which is strong enough to produce a gamma ray of sufficient penetration, at sufficient voltage. In other words, it must transform a deep seated cancer into a superficial one, as far as its treatment possibilities are concerned.

The alpha and beta rays being of no particular use, except that of burning the skin, which is to be avoided, filters must be interposed between the focus towards which the x rays are directed, and the tumor which is to be treated. These filters consist of brass and aluminum and have the disadvantage of filtering out a large proportion of the deeply penetrating rays at the same time. Therefore, a much stronger unit for the production of current and a much more complicated tube for the evolution of x rays are naturally necessary to obtain the same effect in a deep seated cancer, which can be obtained and is being obtained by the ordinary machine in superficial or outward malignancies.

The so-called deep therapy machines answer these requisites, certainly not in full, but to an infinitely, incomparably more efficient manner than anything else at our disposal at present.

To give you a concrete example in figures: To destroy a skin malignancy it is necessary to expose the cancer for twelve minutes, 8 inches away from the target in the x ray tube, using 2 milliamperage current, a  $6\frac{1}{2}$ -inch spark gap and about 800,000 volts, unfiltered.

To obtain the same result in a deep seated malignancy, say that of a bladder, the spark gap has to be increased from  $6\frac{1}{2}$  inches to 20 inches. To produce a current which will penetrate deep enough to reach the tumor mass, the milliamperage has to be 20 milliamperes instead of 2 milliamperes. To obtain the relatively same amount of gamma rays, on account of the interposition of filters, the absence of which would cause terrific burns to the patient, the time has to be lengthened to approximately four hours and the voltage increased from 80,000 to 180,000 or 200,000 volts. There are a great many drawbacks to this treatment, being so technical, however, that I shall refrain from going into details regarding it, but with ordinary care in measuring the

dose and establishing the location of the tumor and the observation of those precautionary measures, which are now being used by careful operators, many of these drawbacks may be discounted.

2. Radium. The action of radium is similar to x ray and there is an evolution of rays similar to the one described in roentgen rays. Radium may be used as an application direct on a cancer, either in the form of needles, which are imbedded into the tumor, in form of globules, which are placed into the tumor, or in form of the so-called emanation, which can be implanted into tumors which are to be treated.

There are locations where the x ray is impractical or very difficult to get at, and for those locations radium answers the purpose.

All of these methods described are necessary for the successful treatment of cancer. In most instances it is necessary to combine two, three or even the four of these methods. None of these are cure-alls and the prediction of most men well versed in treatment of cancer is that the successful treatment of cancer depends on the judicious use of these agents at hand.

#### DISCUSSION

Dr. E. W. Carr (Lyons, N. Y.): I would just like to ask the Doctor concerning his technique, as to whether he is using filters with this work, and, if so, how much? Are you using the superficial x ray?

Dr. Hollander: The technique that is used is as follows: Holzknecht described the erythematous dose for the skin about fourteen or sixteen years ago and MacKee of New York standardized it. The amount of x ray which will cause a blush on the skin within ten days is an erythematous dose; anything beyond that, of course, is an increase of a dose. Now, in order to obtain an erythematous dose (I am speaking of surface erythema only) use 4 milliamperes and a  $\frac{1}{2}$ -inch spark gap at a 9 inch focal distance for three minutes. That is an erythema dose. We can prove that in several ways. You can get this erythema dose if you give it at one sitting or if you give it once a week for four weeks. It doesn't make any difference.

We use four times that amount for a malignancy at one single treatment and we call that four units, or what the American roentgenologist calls ten x's. No one in this country uses such a high dosage, to my knowledge,

and my purpose of coming before you is to plead for that particular amount of x ray as one single treatment. Don't give one unit four times a week, give four units once every four weeks if you want to get results in any of these malignancies. MacKee of New York and a great many other men advocate two and one-half to three units. I believe that the results we have gotten from two and one-half and three units cannot be compared with the results that I can show with four units.

All this is done with an unfiltered ray. We believe, of course, with the rest of you, that the alpha and beta rays are not of any particular purpose, but I believe also that you cannot deliver your gamma ray with filtration, that is, on skin malignancies, in the proper way.

Deep therapy is figured out according to the depth of the lesion. I wasn't able to show you some of our results from deep therapy, such as glands, etc. In those cases we are using, of course, filters of aluminum, leather and copper, and there we give exactly the same amount as we are giving on the skin, using all the portals of entry that we can possibly use.

Dr. Otis: Do you wait until your erythema clears up before you repeat?

Dr. Hollander: You will find in one week's time, when your patient returns, there is a very noticeable redness. Two weeks later it is going to get worse. Don't have the patient put any dressings on at all. Leave it exposed to the air. If they must use something, get them a preparation like alcohol or listerine, or any simple thing. Have them dilute it with a little water and let them sponge it a couple of times if they must do something. Do not use any salves, and if you use a local wash of that character, be sure to tell your patient not to irritate the lesion.

Now, on the third week when they return you will find that vesiculation has decreased, if there is any, and that the reaction is beginning to subside. In four weeks' time your reaction is perhaps at an ebb. If you have a slight amount of erythema, do not repeat your dose at that time. Wait a week, then repeat, but do not give them a smaller dose the second time than you gave them the first time. As sure as you do, you are going to stimulate the growth beyond any hope of repair. Repeat the four unit dose again and wait again.

There is one point of considerable importance. When your lesion is beginning to clear

up, as your edges are beginning to come together, shield off your lesion with lead, making your lesion smaller and smaller. There is no use destroying good skin. To begin with, leave yourself enough margin; whether you leave half an inch around or one inch around it doesn't make any difference as long as you

know what you are doing. You can destroy good skin with x ray and that skin is going to return. Maybe two years later you are going to have some telangiectasia, but it doesn't make any difference with the squamous cell type of malignancy.

## The Possibilities of Physiotherapy in the Prevention and Treatment of the Paralysis Following Anterior Poliomyelitis\*

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THIS paper was prompted by the desire to present some scientific, logical and practical treatment for the underlying pathology of Infantile Paralysis.

From a review of the literature it is distressing to note that there is nothing therapeutically recommended to reach the underlying pathology of the disease or its sequelae. There is an abundance of literature on the relief of deformities by orthopedic surgery and re-education of muscles, but aside from this the treatment is practically negligible.

As physicians we should be interested in any treatment aimed at the pathology of this or any condition we may be called upon to treat.

### PATHOLOGY

Let us consider the pathology found in this disease. Allow me to quote from Lovett's Treatment of Infantile Paralysis. "Infantile paralysis is a general infection, the results of which are most marked in the nervous system. The first stage in the pathological process is an acute interstitial meningitis, usually most marked on the anterior surface of the spinal cord. In the cord itself there occurs a hyperemia, and a collection of small round cells in the lymph spaces surrounding the vessels.

"In many places the cells are so numerous that they press on the lumen of the vessel and exert a mechanical effect in obstructing the circulation. Minute or extensive hemorrhages occur, and there is an extensive edema. These three factors: Cellular exudate, hemorrhages and edema appear to be the primary reaction of the nervous system to the virus of infantile paralysis. Because the virus reaches the nervous system through the blood stream

the cervical and lumbar enlargements of the cord are most often affected, and the anterior horns more often than the posterior or the white matter, for in these regions the blood supply is most abundant.

"Although the process by which the vascular lesions affect the nerve cells is in a large measure a mechanical one, it is impossible to exclude the fact that the virus may exert some direct toxic action on these cells, but whether or not this is the case, many of the conditions may be explained by the circulatory disturbances and the exudate.

"The damaging effects, therefore, are to be attributed in part to direct pressure on the nerve cells by hemorrhages, edema and exudate, to which must be added the anemia following the constriction of the blood vessels. On account of this pressure, and anemia, the nerve cells degenerate and if the hemorrhage and exudate are absorbed soon enough the cells may recover function, but if the unfavorable conditions have been prolonged too long or are excessive, the nerve cells may go on to complete degeneration.

"The terminal stage in the pathological changes is represented by the replacement of the motor cells by focal scleroses due to increase of neuroglia tissue. The lesions are analogous to focal fibroses or areas of scar tissue, due to an increase of connective tissue as found in any other organs. Shrinking occurs in severe cases. The destruction of spinal cells in any center naturally represents a loss of function of those cells, but the connections between the bundles of motor cells and the connections between muscles and the motor centers are so free and manifold that, unless the destruction has been very extensive, the possibility remains of establishing new connections between other motor cells and muscles."

\*Read at the X Ray, Radium and Physiotherapy meeting, Omaha, Jan. 5, 1925.

**SIGNS AND SYMPTOMS**

So much for the pathology we are to treat. Let us now consider the effects of this pathology which we are also obliged to treat if we are to obtain results. The paralysis of the disease is a motor paralysis or weakening of erratic distribution, most marked in the legs. Reflexes are diminished or lost, the reaction of degeneration is present in the most severely paralyzed muscles, atrophy, retarded growth, coldness and sluggish circulation supervene in the later stages in many cases.

**TREATMENT**

The treatment must necessarily be directed:

- I. To the pathology in the spinal cord.
- II. To the paralyzed muscles which are the result of this pathology.

**TREATMENT OF THE SPINAL CORD:** (1) *Diathermy:* With this given pathology and a knowledge of the high frequency current and the technique of diathermy, there could not, in my opinion, be a more desirable therapy. By diathermy we can apply to the spinal cord the most efficient kind of heat, conversive heat, created in the tissue itself by its own resistance. It is indicated here for its solvent effect, to open up afferent and efferent channels, increase metabolism, carry away broken down inflammatory products, to relieve the pressure on the nerve cells by breaking up focal fibroses and scar tissue, absorbing old hemorrhages and exudates, by dilating the constricted blood vessels and bringing a fresh, wholesome supply of blood to the cord, thereby relieving the anemia and assisting nature in the regeneration of nerve cells and the establishing of new connections between motor cells and muscles.

(2) *Static Condenser Discharge:* If diathermy alone be used the softer parts expand more than the hard, bony spine surrounding the cord and more pressure is created with its resultant passive hyperemia, which further interferes with the already poor and sluggish circulation. To this newly created hyperemia and increased blood supply within the cord let us now apply the static condenser discharge with its more than 100,000 volts and its ability to produce powerful rhythmic, slow contractions, and thereby squeeze out this warm, fresh blood previously brought into this area by diathermy and assist it on its way carrying out the waste products with it. This acts as a powerful massage of the parts treated and, so far as I can conceive, cannot be accomplished in any other way. The sinusoidal current can

accomplish this in soft tissue such as the prostate, but lacks the power to be of value in this location.

(3) *Ionizing X Ray:* Once weekly let us ionize the cord with five milliampere-minutes of a 5 inch back-up spark x ray through one millimeter of aluminum filter at an 8 inch target skin distance for its chemical solvent effect upon the hardened and sclerosed tissue in the cord. Probably some of you do not believe in the ionizing x ray dosages, but having tried it, all I can say is that it works. It does what we expect it to do. So much for the treatment of the spinal cord.

**TREATMENT OF THE PARALYZED MUSCLES:** Now, let us consider briefly the paralysis, resulting from the pathology in the cord, and its treatment. Here we find many, many muscles involved, the abdominal muscles, muscles of the back, neck, face and extremities. Statistics show 72 per cent of cases paralyzed in the abdomen, 13½ per cent in the back, 11 per cent in the neck and in a series of 90 cases, 31 showed involvement of facial muscles, but by far the greater number showed paralysis of the legs and arms. It is surprising the number of cases showing disturbances of circulation accompanied by atrophy of both bone and muscles and retarded growth, the whole group being spoken of as trophic disturbances. During cold weather such limbs become cold and blue, subcutaneous areas of discolored tissue often occur which may break down and become infected, causing indolent ulcers.

To prevent such an occurrence one should test out the various muscles and sets of muscles as to reaction of regeneration, finding out which muscles are affected and to what degree, and record these for reference during treatment of these particular muscles. The question is: what shall this treatment be?

(1) *Diathermy:* Surely diathermy is indicated, for what could bring the blood to these parts with disturbed circulation and atrophy of muscle, and probably bone, as does diathermy? If these tissues be well supplied and nourished with blood we can do much to prevent the atrophy, retarded growth and trophic disturbances. Diathermize all available paralyzed and undernourished muscles, using a small amount of sedative diathermy at the start and gradually increase the dosage as required.

(2) *Slow Sinusoidal Current:* For the graduated and accurate massage and exercise of

these muscles, to do just that which the patient of his own volition cannot do, to keep down or prevent the atrophy of disuse until regeneration has proceeded far enough that voluntary motion can be had, for the performance of this function the slow sinusoidal current is unsurpassable. Start with a very small amount of current, allow several parts of rest to one of contraction, and request the patient to concentrate his mind on moving that particular muscle and attempt to re-educate that muscle. Slowly and gradually increase the current as the muscle improves in strength, but be very careful indeed that you do not fatigue any weak muscle, as this is worse than no exercise at all. When voluntary movement is obtained request moderate and gradual exercise, warning your patient against overwork.

(3) *Ultra Violet Light:* The air cooled lamp should be used for general body radiation during the whole period of treatment. Remember we are dealing with the effects of an infectious disease, a continued mild sepsis, and a loss of appetite which may persist for some time. In some cases months may elapse before the general health becomes normal, the general sequelae being much the same as after one of the acute exanthemata, and these patients need the wonderful tonic and blood building properties of ultra violet light. The disturbance of circulation and retarded growth will surely respond to this therapy.

The question now naturally arises as to how soon after the acute attack of Infantile Paralysis this treatment should be started. This undoubtedly is an important question, and I believe the success of our treatment depends much upon the decision made. According to authorities on the subject, the treatment may be divided into three phases:

(a) The acute phase—from the onset of the malady to the disappearance of tenderness.

(b) The convalescent phase—beginning at the end of the acute phase (about two weeks) and continuing as long as spontaneous improvement is marked (about 2 years).

(c) The chronic phase—when the affection has become more stationary and deformities, if present, have become established.

It is in the second or convalescent phase that we are most interested for three reasons:

(a) First, because before this time we are dealing with possible hemorrhages, congestion and irritation in the cord—a still active process in which case diathermy or any active treatment is contra-indicated.

(b) Second, because it is during the convalescent phase that these patients seek medical advice and treatment, and

(c) Third, because during this time the greatest amount of good may be accomplished.

When the acute stage of the process in the cord may be assumed to be at an end, then one may make an estimate of the damage done and plan a campaign of treatment. Pathologically the products of hemorrhage are being absorbed, edema and perivascular infiltration are diminishing, and physiologically the motor area of the brain is trying to send impulses to the affected muscles only to find the path of conduction partly or wholly blocked. All nerve cells are not destroyed. Some are only injured and may recover if treated soon. Nature in this stage is working hardest to repair and restore function and we should aid her by the most natural treatment available—Physiotherapy. The outlook is better in the first year than later, but there seems to be no time limit for obtaining beneficial results from treatment. Most deformities could be prevented, for the majority of muscles are not paralyzed at this time, but are only weakened. Impulses from the brain may be sent around the destroyed centers by new paths to the muscle. This is best accomplished by muscle training, exercise and proper treatment of weakened muscles at this time.

#### CONCLUSION

The writer believes that much of the permanent paralysis of Anterior-Poliomyelitis can be prevented if proper and scientific treatment be afforded at the proper time and faithfully pursued, and that Physiotherapy offers the greatest possibilities toward that goal of any treatment known today.

214 Kirkpatrick Bldg.

#### DISCUSSION

Q. I would like to ask what should be done where there is a paralysis in the back that weakens the support of the spine. Would you suggest applying any mechanical brace to support the spine for the time being? Permit me to make myself clear by citing a specific case.

Early last summer, a girl, 14 years of age, had a fall. This occurred during a visit in northern Colorado. She was sent to her home in New Mexico, where she started to school at the beginning of the term. A little later she took sick, complained of a sore throat, developed a high temperature and inside of thirty six hours, according to the history, suf-

ferred a paralysis of the lower limbs. Two or three doctors had seen her and stated it was due to the fall. She was brought to Denver and at which time I saw her. A diagnosis was made of infantile paralysis. The mother objected, stating that the diagnosis was wrong. She was certain it was due to the fall.

I could find no evidence of injury from the fall, but called in for consultation an orthopedic man, who agreed with me in the diagnosis. I turned the case over to him. After some months of treatment in the way of exercise, etc., he began using a brace for the back, and the patient gradually improved. However, there has been no diathermy or physiotherapy used.

Dr. Kessler: I most certainly would use the brace or the support as I found it necessary. Until such time that treatment by diathermy to nourish that set of muscles in the back, and sinusoidal electricity to act as a gentle massage and the muscles were able to function and take up their share of the work of holding that back in position, I would certainly assist it by the use of a brace.

Don't understand me to say that we are to give treatments with physiotherapy to every disease or condition, and that we are to forget our past knowledge of medicine, of splints and braces and supports. A great many men in my own immediate community have the idea that because I am using physiotherapy I can do anything with it. One man had the nerve to send me a case of a skin disease to be treated by ultra violet light, but he refused to give the patient the necessary internal treatment. As a result I absolutely refused to take the case. His reply to my viewpoint was, "I want to try this out and see if it will do what they say it will."

That is not a square deal. You could not limit that man to any one particular thing in his practice. If you would limit him to the use of only tincture of iodine he would quit practicing; yet he expects me to accomplish everything with ultra violet. There are many such practicing and criticizing men who neglect to look at these attributes as therapeutic ad-

juncts possessing indications and contra-indications of any medical measure.

In treating your cases, do the very same thing while using physiotherapy that you have always done before, but simply add physiotherapy to it, and I believe you will get results.

Q. What period of time does it take to overcome these paralyses with this type of treatment?

Dr. Kessler: That is a question that is hard to answer. The best authorities that I have been able to find on this subject say that there is no time limit. There have been cases of infantile paralysis that have been treated after two years of the onset by manual massage, salt water baths and such treatments as that, and have made wonderful improvement. We do not know how long it will take these conditions to improve, and it was on this account I wrote this paper. We have heretofore been waiting until Nature has done her best, without any assistance on our part—until the damage in the cord and all other damage has taken place—before we came to her assistance. I believe by this treatment we can revive the injured nerve cells and in the meantime keep up the circulation and muscular exercise, and keep down the trouble so that when there is regeneration it will have something to act upon.

The orthopedist is supposed to wait two years before operative procedure. If there is any chance for a complete paralysis and deformity it will have taken place in that time. During the first two years is the time for us to administer physiotherapy. After that these cases should be given to the surgeon.

Q. How often would you administer such treatments?

Dr. Kessler: I would take into consideration the patient, and get an idea how much treatment he could stand. I do not think you can lay down a rule for physiotherapeutic treatment, any safer than you can for other therapeutic measures. It depends entirely upon the patient. Some people can take ultra violet light every day, while others cannot tolerate the light so often.

# The Direct Effect of Radium Irradiation on Leukocytes\*

ROY G. SPURLING, M. D., and JOHN S. LAWRENCE, M. D.,  
Boston, Mass.

(From the Medical Service of the Collis P. Huntington Memorial Hospital and the Laboratory for Surgical Research of the Harvard Medical School.)

HISTOLOGICAL alterations in the character of the leukocytes in the circulating blood occur following relatively large therapeutic doses of irradiation from radium and roentgen rays. These changes for the most part are destructive in nature; every phase of degeneration from vacuolization to complete disintegration of the white blood corpuscles has been observed. Minot and Spurling<sup>1</sup> have shown that following therapeutic short wave length roentgen ray irradiation, the degenerated leukocytes range from 10 to 40 per 100 formed white cells. They usually reach their highest level on the second day following exposure to the rays, but abnormal numbers are to be found within an hour after treatment. Whether these changes are the result of the direct effect of irradiation on the leukocytes in the circulating blood, or an indirect effect of the rays upon them, has been a matter of speculation. The experiments described below were undertaken for the purpose of attempting to obtain information concerning this subject.

Experiments were conducted on dogs under ether anesthesia and one was repeated on a man. In these experiments, stasis of the peripheral blood was created, as this was necessary in order to prove that irradiation directly destroys leukocytes in the blood stream. Another experiment to determine the direct effect of irradiation on leukocytes was performed on human blood outside the body. The technique and nature of the four varieties of experiments conducted are given below:

1. A tourniquet was applied to both hind limbs of a dog at about the level of the middle of the thigh. The pressure applied was sufficient to cause venous stasis without wholly impeding the entrance of arterial blood to the extremity. An erythema dose of radium emanation was given over one leg, the other served

\*Reprinted by permission of the authors and publishers—The American Journal Medical Sciences 169, February, 1925.

Note: This paper is No. 33 of a series of studies in metabolism from the Harvard Medical School and allied Hospitals. The expenses of this investigation have been defrayed (in part) by a grant from the Proctor Fund of the Harvard School for the Study of Chronic Diseases.

as a control. Blood was obtained before irradiation and every fifteen minutes thereafter for one and one-quarter hours by puncturing with a cutting edge needle the deep tissues of the legs below the tourniquets. The white blood corpuscles were studied in carefully made Wright stained blood smear preparations, as was the case in the other experiments noted below. Seven experiments of this first variety were performed.

2. In the second form of experiment on dogs, a section about two inches long of both femoral veins was tied off in the femoral triangle. An erythema dose of radium emanation was applied over one of these segments. The ligated strip of vein of the opposite leg served as a control, and care was taken to screen it from the rays.

Samples of blood for study were obtained from each of the tied off segments by means of a small hypodermic needle before irradiation and afterward every fifteen minutes during one and one-quarter hours. (No edema of either leg developed and the animal suffered no ill effects from the ligation of both femoral veins.) One such experiment was conducted.

3. The third variety of experiment was performed twice on man. Sphygmomanometers were applied to both upper arms of a patient and the pressure kept just above the diastolic arterial pressure for forty-five minutes. Slightly less than an erythema dose of radium emanation was applied over the median basilic vein of one arm. Four samples of blood were taken directly from the vein of each arm at intervals of fifteen minutes.

4. The last type of experiment consisted of irradiating with radium emanation, equal to two erythema doses, citrated human blood placed in a flat glass dish. The citrated blood was exposed directly to the rays, thus making it unnecessary to pass the rays through glass. Then the leukocytes were examined for evidences of histological changes every fifteen minutes for one and one-half hours.

No constant changes in the character of the leukocytes which could be attributed to the effect of irradiation were observed in any of

the four different types of experiments. The number of degenerated forms were essentially the same (less than 8 per 100 formed white cells) and the differential count remained practically constant, in the preparations obtained from the area exposed to radium in the experiments on dog and man (procedures 2 and 3 above). There was, also, no difference in the character or differential count of the leukocytes from that seen in the control samples of blood. Likewise no alterations in the leukocytes were detected when they were irradiated outside the body (procedure 4 above).

In procedure 1, in which the blood was obtained from dogs' subcutaneous tissue, many leukocytes in every stage of disintegration were observed in several of the blood smears. In the first three animals, these broken forms were more plentiful in the smears made of the blood taken from the leg which had been exposed to the radium than in the control preparations. It thus appeared as if the irradiation was responsible for the changes. Analysis of the method of collecting the blood and similar subsequent experiments clearly showed that it was the technique by which the blood was obtained that was responsible for these disintegrated leukocytes. Four experiments in which blood was obtained by proper technique permitted no changes from normal of any sort in the leukocytes from the irradiated and nonirradiated extremity. Thus the results of the first experiments on dogs can be reconciled as in accord with those obtained from the other studies made.

The technique that caused the presence of many disintegrated leukocytes in the blood smears from dogs depended upon the squeezing and manipulating of tissue. It was demonstrated at will that leukocytes of this character could be found in abundance in preparations made when the blood was obtained from skin puncture with forceful manipulation, but when a relatively large vessel was punctured, so that the blood flowed freely, preparations made from it showed but a scant number of broken leukocytes. It is much more difficult to destroy white blood corpuscles by mechanical manipulation of tissue in man than in dogs. This is partly because of the known fact that dogs' leukocytes are more fragile than those of man. An additional reason is probably because blood flows much more readily from a small needle prick of the human skin than from one in a dog. We were unable to obtain, after considerable manipulation of patients' tissues, more

than 10 broken leukocytes per 100 formed ones in blood smears properly made on cover glasses. Of course, the many degenerated leukocytes repeatedly observed in the circulating blood following therapeutic irradiation are not due to any errors of technique, because it is well known that the leukocytes in similarly obtained blood smears prior to irradiation show no such changes. It seems evident that irradiation from radium does not directly affect the character of the leukocytes within an hour and a quarter after exposure and that some indirect effect is responsible for the degenerated forms seen following therapeutic irradiation.

In our experiments, where the blood stasis persisted from three-quarters to one and one-quarter hours, there were no constant changes in the differential leukocyte counts of the blood taken from the constricted extremity. In contrast to these results, Webb<sup>2</sup> has shown that there is both a relative and absolute increase in the number of lymphocytes following the application of a tourniquet to a leg of a man and the hind extremities of rabbits. In his experiments on man, he found an 18 per cent increase in the number of "mononuclears" in as brief a period as a half hour, and a 75 per cent increase after one hour. His experiments, like our own, attempted to obstruct the venous return without impeding the flow of arterial blood. Calve<sup>3</sup> also found an inversion of the differential leukocyte count, following the constriction of an extremity in man. While he does not make it clear just how long was required for this to take place, it appears that he observed this change within thirty minutes following the application of a tourniquet. Unfortunately, neither Webb nor Calve definitely state from where the samples of blood were obtained. It would appear, however, that they were taken from the general circulation and not from the isolated extremity. If this was the case, their experiments were not parallel to our own, as we obtained samples of blood from a point below the tourniquet where blood presumably had been isolated, which did not become mixed with that of the general circulation during the period of the experiment. It is difficult for us to see why the differential count of white cells in the blood of an extremity should change markedly in a brief period of time, even if one accepts the theory of mitotic division of lymphocytes. On the other hand, it is quite conceivable that a relative and absolutely lymphocy-

tosis may occur in the general circulation following the constriction of an extremity.

#### SUMMARY

1. Radium irradiation of blood retained in an extremity of a dog or man, or in a vein of a dog, produced no demonstrable changes in the character of percentage numbers of different types of leukocytes in one and a quarter hours. Likewise, the stasis of blood in an extremity or vein for a similar period of time was without effect on the leukocytes.

2. The manipulation of dogs' superficial tissues in obtaining blood produces destruction

of leukocytes much more readily than similar trauma in man.

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## CASE REPORTS

### Dermoid Cyst of the Pleural Cavity\*

F. J. SCHLEIER, M. D.,  
Omaha, Nebr.

THIS case is reported because I am under the impression that it is rather an unusual one. Although my search has not been very thorough, I have been unable to find in the textbooks or literature available to me anything concerning a similar case. Dermoids, as we know, are rather common; but the peculiar location is the striking factor in this particular case.

The case first came under my observation during the latter part of May, 1922, and the history was taken July 18, 1922, at the time of the patient's admission to St. Joseph's Hospital.

**History**—K., a white woman, aged 23, who was born in Iowa, and who weighed 132 pounds (60 kg.), complained of pain on the right side along the lower costal border. She was well developed and well nourished. Her family history was essentially negative. The father, mother, three brothers and three sisters were all alive and well. She had had the usual childhood diseases, but had always been strong and well. Her personal history was negative

except for chronic constipation and an occasional nonproductive cough.

**Present Illness**—About one and one-half years before I saw her, the patient had a severe attack of influenza, accompanied by a right-sided pleurisy. Pain and all the symptoms of acute illness cleared up in the course of ten days or two weeks and the patient was apparently in normal health, except for the pleuritic pain and some gastric distress, which she described as attacks of indigestion. The pains in the costal region and the right upper part of the abdomen were not constant, but occurred at intervals. The pain started at about the tenth rib in the midscapular line and radiated upward and forward. It was quite severe and lancinating in character. It had not become progressively worse. It was not aggravated by deep breathing. The patient had some cough and dyspnea, but no constitutional symptoms. She had felt strong and well and had gained 5 or 6 pounds (2.5 kg.) in the past two or three months.

**Physical Examination**—The pupils were regular and reacted to light and accommodation; the heart was normal; the chest showed no rales; there was an area of dullness and

\*Reprinted by permission of the author and publisher—J. A. M. A., 84:1038-9, April 4, 1925.

absence of breath sounds in the right lung field extending up to the level of the fifth rib; and bulging of the right chest wall. Otherwise, the physical findings were normal. A small aspirating needle introduced at the seventh interspace revealed nothing. The patient was referred to Dr. James Kelly for a roentgen ray examination of the right chest. He found the entire lower half of the right lung field obliterated by a dense mass, looking like fluid or pus. The parenchyma of the lung above the mass was clear. The left lung was clear. The mass reached to the lower border of the fourth rib in the midaxillary line. The heart was displaced to the left.

A tentative diagnosis of an atypical empyema was made. A second aspiration was done July 19 with a much larger needle. A small quantity of very thick, greenish-yellow material was obtained which had the macroscopic appearance of pus. Under ether anesthesia, a resection was done of about 2 inches of the seventh and eighth ribs, slightly posterior to the midaxillary line. When the pleura was opened, a second distinct layer was encountered, and when this layer was opened, a large quantity of caseous material escaped from the cavity. This material was of a very foul odor and contained a considerable quantity of hair. The sac was of such an extent that it was

deemed inadvisable to attempt its removal. The contents were evacuated as well as possible. About 4 quarts of this material was removed, which weighed approximately 18 pounds (8.2 kg.). The cavity was then packed with gauze and the edge of the sac sutured to the fascia. The wound was left wide open. After several days, the gauze was removed and a large rubber tube was introduced. The cavity was irrigated twice daily with physiologic sodium chlorid solution. The patient had a rather stormy convalescence, but was discharged from the hospital August 29. The drainage tube was left in place and there was considerable discharge from the cavity.

The patient at this time refused any further surgical intervention. The discharge gradually lessened and the external opening became smaller. About one year from the date of operation, the patient being in fairly good health and the external opening small, it was impossible to continue the use of the drainage tube, which was removed. The discharge, however, continued to drain through a small sinus, which would occasionally close, and the patient would have attacks of acute illness, pain and fever, when the sinus would reopen and a large quantity of pus escape from the cavity. The patient would then improve, until consid-

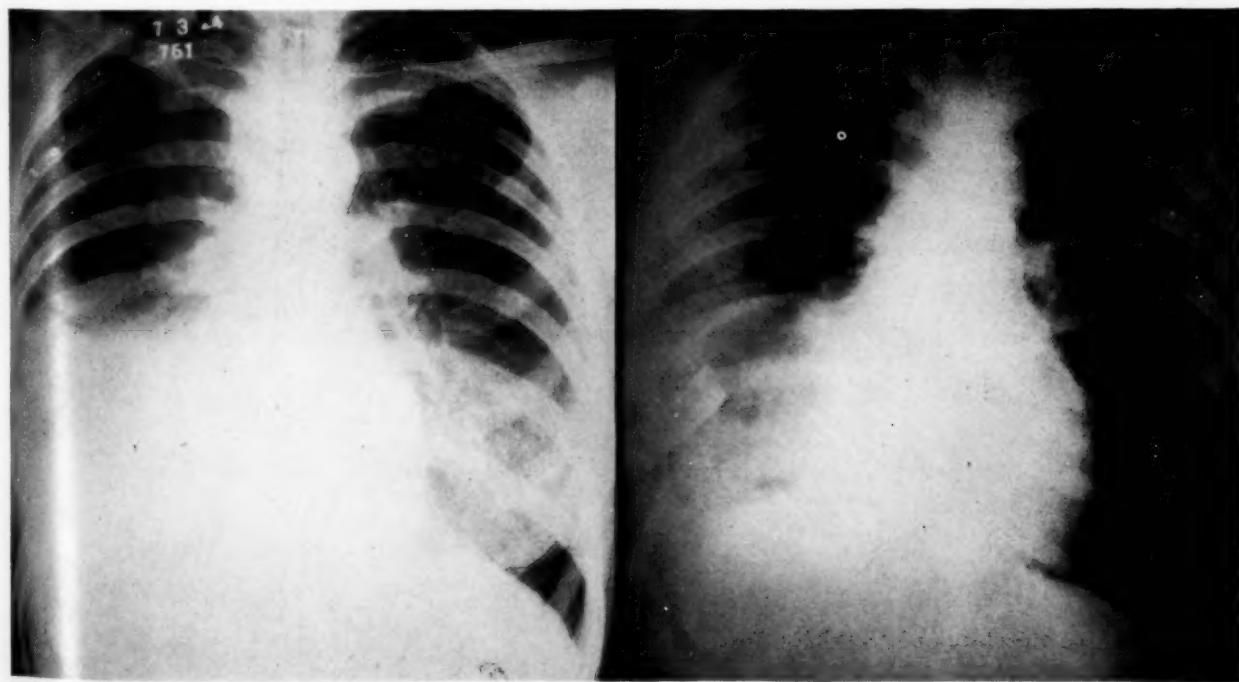


Fig. 1.—Result of examination May 31, 1922: Obliteration of entire lower half of right lung by a dense mass looking like fluid or pus; parenchyma of lung above mass, clear; left lung, clear; mass reached to lower border of fourth rib in midaxillary line; heart dis-

placed to the left.

Fig. 2.—Condition July 3, 1923: Cyst cavity still present, measuring about 7.5 cm. in diameter; fluid occupied lower three-fourths of cavity, with air in upper fourth.

erable quantity of pus accumulated in the cavity.

During this time and up to the first part of July, 1924, the patient had been more or less under her own treatment, persistently refusing to allow anything to be done to relieve her condition. July 13, 1924, she came under my observation again and presented the picture of a very sick patient. Her weight was 105 pounds (47.6 kg.). There was a very small sinus at the site of the previous drainage, from which exuded a very foul smelling, mucopurulent discharge. She re-entered the hospital and a roentgen ray examination at that time showed a cyst cavity still present, 7.2 cm. in diameter. The fluid occupied the lower three-fourths of the cavity, with air in the upper fourth. The cavity was the same size as at the last examination.

July 16, under local anesthesia, I made an incision, removing the old scar, and resected about 2 inches of the eighth and ninth ribs; I evacuated about 6 ounces of pus and caseous material and inserted a five-eighths inch rubber drainage tube into the cavity. Apparently the greater part of the cyst wall had been

obliterated, and the cavity was lined with granulation tissue. An irregular area approximately the size of a half dollar on the anterior surface of the cavity, which was apparently part of the dermoid sac, remained undestroyed. This was freely cauterized with 20 per cent silver nitrate solution. The cavity was irrigated twice daily with physiologic sodium chlorid solution.

The patient's general condition improved rapidly, and she was discharged from the hospital July 26. The cavity at that time had a capacity of approximately 3 ounces (90 c.c.). The dermoid sac was apparently completely destroyed, and the discharge from the cavity was very slight. The patient has been instructed to use blow bottles in the hopes of collapsing the cavity, and, in the event this fails, it is my intention to do a thoracotomy with the hope of completely obliterating the cavity. This operation, however, will be delayed until the patient is in better physical condition, as she is at this time constantly gaining weight and improving in every way. The temperature has remained normal since the last operation.

1140 First National Bank Building.

# EDITORIAL

## The JOURNAL OF RADIOLGY

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A. F. TYLER, M. D.  
Managing Editor

## ANNUAL MEETING AMERICAN COLLEGE RADIOLGY AND PHYSIOTHERAPY CHICAGO Oct. 19, 20, 21, 22

—o—  
One Whole Day Devoted to Clinics; Actual Demonstration of All Branches of Physiotherapy, X Ray and Radium

### PRELIMINARY PROGRAM

MONDAY, OCTOBER 19, 1925

#### CLINICS

- Wesley Hospital—  
"Industrial Physiotherapy" *Paul Magnuson, M. D.*  
Cook County Hospital—  
"General Physiotherapy" . . . *J. S. Coulter, M. D.*  
"Electrocoagulation of Malignant Tumors" . . .  
Frank J. Novak, Jr., M. D.  
"General Physiotherapy" . . . *Disraeli Kobak, M. D.*  
American Hospital—  
"Cancer Clinic" . . . *T. Howard Plank, M. D.*  
Hollender and Cottle Clinic—"Physiotherapy in Eye, Ear, Nose and Throat Practice"  
*A. R. Hollender, M. D., and M. H. Cottle, M. D.*

TUESDAY, OCTOBER 20, 1925

#### Registration

#### Business Session

- Presidential Address—"The Past, the Present and the Future"—*Curran Pope, M. D.*, Louisville, Ky.  
"Status of Radiotherapy in Otolaryngology,"  
*Ira O. Denman, M. D.*, Toledo, Ohio, Otolaryngologist.  
"Radium Therapy,"  
*C. W. Hanford, M. D.*, Chicago. Consulting Radium Therapist Cook County Hospital.

#### "Radiation Therapy,"

*J. R. Ranson, M. D.*, Denver Colo. Formerly Consulting Physician Colorado Radium Company.

#### "The Radiological Diagnosis of Early Pulmonary Tuberculosis,"

*Roland G. Breuer, M. D.*, Norton, Kans. Assistant Physician Kansas State Sanatorium for Tuberculosis.

#### "Artificial Light Therapy in Tuberculosis,"

*Edgar Mayer, M. D.*, Saranac Lake, N. Y. Physician Saranac Lake Sanatorium for Tuberculosis.

#### "Quartz Light Therapy in Otolaryngology,"

*Roy A. Barlow, M. D.*, Madison, Wis. Otolaryngologist University of Wisconsin.

#### "Water as a Therapeutic Agent,"

*Charles E. Stewart, M. D.*, Battle Creek, Mich. Physiotherapist Battle Creek Sanitarium.

#### "Therapeutic Exercise—A Neglected Method in Physiotherapy,"

*J. C. Elsom, M. D.*, Madison, Wis. Physiotherapist University of Wisconsin.

#### EVENING SESSION

#### Subject to be Announced,

*W. T. Bovie, Ph. D.*, Professor of Biophysics Harvard Medical School.

Fellowship Gathering and Smoker.

#### WEDNESDAY, OCTOBER 21, 1925

#### "Diathermy in Gonorrhreal Diseases of the Male,"

*Damon Brown, M. D.*, Madison, Wis.

#### "Diathermy in Gynecology and Genito-Urinary Practice,"

*B. H. Hager, M. D.*, Madison, Wis. Urologist, University of Wisconsin.

#### "Diathermy on Medical Kidney Disease,"

*Gustave Kolischer, M. D.*, Chicago. Associate Professor Genito-Urinary Diseases. Post Graduate Medical School.

#### "Bladder Tumors as Treated by Thermo-Electric Coagulation,"

*B. C. Corbus, M. D.*, Chicago. Inventor of Thermaphore for Treatment of Endocervicitis by Diathermy. Author of Book on this Method of Treatment.

#### "X-Ray Therapy Twenty Years Ago,"

*William Allen Pusey, M. D.*, Chicago. Past President American Medical Association. Professor of Dermatology, University of Illinois Medical School.

#### "Newer Methods in the Treatment of Defective Hearing,"

*M. H. Cottle, M. D.*, Chicago.

#### "The Use of the High Frequency Currents from the Surgeon's Standpoint,"

*A. David Willmoth, M. D.*, Louisville, Ky.

6:30 P. M.

#### Annual College Dinner—Educational Program,

*Wm. Allen Pusey, M. D.*, Past President American Medical Association.

*Maurice Fishbein, M. D.*, Editor Journal American Medical Association.

*D. J. Davis, M. D.*, Professor Pathology and Bacteriology, University of Illinois Medical College.

THURSDAY, OCTOBER 22, 1925

**"Diathermy in Infections."**

*W. B. Chapman, M. D.*, Carthage, Mo. Vice President American College Radiology and Physiotherapy.

**"The Treatment of Non-Union or Delayed Union of Bone and Bursitis."**

*F. B. Granger, M. D.*, Boston, Mass. Radiologist and Physiotherapist, Boston City Hospital.

**"Observations on Physiotherapy Abroad."**

*Disraeli Kobak, M. D.*, Chicago. Attending Physiotherapist Cook County Hospital.

**"Electrothermic Methods in Surgery."**

*Wm. L. Clark, M. D.*, and *H. H. Bass, M. D.*, Philadelphia, Pa. Dr. Clark is a pioneer in the use of electrocoagulation in surgery.

**"Endocrinies and Physiotherapy."**

*Maximilian Kern, M. D.*, Chicago. An internist of wide experience in endocrinology.

Many others whose subjects are now being arranged will appear on the program.

**SPECIAL RAILROAD RATES****CERTIFICATE PLAN**

The Passenger Associations have granted special railroad rates of one and one-half fare for the round trip to those who attend the annual meeting of the American College of Radiology and Physiotherapy.

To take advantage of this reduced rate, you must secure a certificate from the agent selling you the ticket. This certificate must be presented at the meeting for validation. Return fare can then be purchased at one-half the regular rate by presenting the validated certificate to the Agent. A certificate should be secured for each dependent member of your family who accompanies you.

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From Colorado (except Julesburg), Montana, New Mexico, Utah and Wyoming, October 8 to 11, inclusive, and October 16 to 18, inclusive.

From Arizona, British Columbia, California, Idaho, Nevada, Oregon and Washington, October 7 to 10, inclusive, and October 15 to 17, inclusive.

*Final Honoring Date:* October 27, 1925.

A Special Agent will validate certificates on October 12 to 16, inclusive, and October 19 to 23, inclusive.

**Get a Certificate.**

It is self-evident that the Program Committee is sparing no effort to make this meeting one of the most constructive and instructive events in the history of the specialty. And the least that can be done in the promotion of this great work is for each individual to devote a portion of his time and talent to aid in the propagation and production of what is sure to be one of the greatest meetings ever held under a radiological heading.

This can be done in two ways: (1) By an immediate request for the presentation of any

one of the many medical problems or to prepare to take part in the discussions and (2) by assuring the Secretary of your willing co-operation and positive attendance. The immediate request is essential because of the limited time for presentation of the choicest papers. Positive attendance should be given the Secretary in order that sufficient reservations can be made for your accommodation.

Direct all communications to:—

**R. W. FOUTS, M. D.**  
Secretary, American College of Radiology  
and Physiotherapy,

2421 O St., Omaha, Nebr.

**Mlle. Irene Curie**

**M**ADEMOISELLE IRENE CURIE, daughter of Madam Curie, who has for years been interested in and an essential part of the laboratory of her mother, recently received her doctor of science degree by producing a thesis based on original scientific research. The subject with which she has interested herself for some time and which won for her the doctor's degree in the Sorbonne was a *Research on the Alpha Rays of Polonium: Oscillations of the Trajectory Initial Velocity and Ionizing Effect*. It appears that the daughter intends to continue the work of Madam Curie.

**Cambridge Radiological Diploma**

**T**HE University of Cambridge has established a postgraduate course in Medical Radiology and Electrology which consists in a six months' course of lectures and practical work in hospitals. The lectures are given at Cambridge University and include the subjects of physics, radiology and electrology. The practical hospital work is divided into two sections—the first three months' work being given at Addenbrooke's Hospital under pedagogical supervision and the second three months' work can be taken in any recognized hospital. For this six months' course the University of Cambridge grants a *Diploma in Medical Radiology and Electrology*.

**St. Louis Radiology Building**

**A**S the science of radiology advances and its field broadens by its usefulness, installation of adequate equipment is essential. Recently an enlargement of the department of radiology of the St. Louis City Hospital has been begun. Plans have been developed so

efficiently so as to include all essentials for modern, up-to-date radiological service. Let us illustrate by summarizing from the Missouri State Journal:

A separate three-story building, known as the Radiology Building, has been provided for this purpose. All twenty-two rooms are provided for the work of the department; nine complete x ray units are in use and a radium emanation plant, with 545 mg. of radium, has been provided for the treatment of malignant disease.

The department is equipped to do all types of radiological work, both diagnostic and therapeutic. Facilities for the carrying out of any special x ray procedure are provided, such as the localization and removal of foreign bodies under the fluoroscope, pneumoperitoneum examination, bronchoscopic and esophagoscopic examinations under fluoroscopic guidance, fluoroscopy of the kidney at the operating table to determine if stones are present, etc. A special room is also provided for cystoscopic examination and a special x ray cystoscopic table permits the radiographing of the patient while on the cystoscopic table. A special fracture table permits the reduction of fractures by extension apparatus while under direct supervision. Every convenience is at hand to enable a twenty-four hour emergency service. This is only one of many complete constructions soon to come.

#### New Radiology Department—

Edinburgh Royal Infirmary

REFERENCE was made recently in the British medical journals of the forthcoming radiological department of the Edinburgh Royal Infirmary. This department, which is said to be the largest and best equipped in England, is intended to be in working order in the early fall. Detailed description of the building is given in the *British Journal of Radiology* of April, 1925. The ground floor will be arranged for radiography—for photographing, screening, developing and deep therapy work. The deep therapy room will be used chiefly in the treatment of cancer. On the ground floor there will be a demonstration room to accommodate 100 or more students, together with research laboratory, administrative, waiting and dressing rooms. On the upper floor, the physiotherapeutic apparatus and treatment rooms are to be installed. In all, this will be a valuable aid in the development of the science of radiology in the British Isles.

#### Safety First

THE Surgeon General of the U. S. Public Health Service issued general instructions to remove from the clinical record files as many of the used x ray films of inflammable type as are not essential for record purposes. One of the large eastern hospitals, complying with the orders issued, eliminated approximately 600 pounds of the old style used films from its records. This material had a small sales value.

The fire hazard of these nitrocellulose films, especially when filed away as a part of clinical records, is very great and is in conflict with the fire regulations of most large cities. Each radiologist possessing such films stored away among his clinical records should dispose of the nonessential ones as soon as possible, acting on the recommendation and following the example set. The use of fire-resisting films, which are not more inflammable than ordinary paper and the storage of which presents no special problem, was introduced in all Marine Hospitals on July 1, 1924, and are used by most of the individual radiologists today.

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#### Nahum E. Luboshez, F. R. P. S.

THE death of Mr. Nahum Ellan Luboshez ends the successful career of one of the greatest contributors to photography and to radiology. His name will always be associated with the duplitized film and the development of radiographic technique.

Nahum E. Luboshez was born in Russia in 1869, the grandson of one of the greatest of oriental philosophers. His early life was spent in his native country studying literature and artistry. His youth was spent in New York earnestly absorbing photography and attempting to express his artistic nature through this channel. In his early manhood he returned to Europe to continue his study under the direction of Professor Schirm at the Academy of Arts in Berlin. At twenty-two years of age he again came to New York, but after two years' stay returned to the Paris Academy to complete his study.

During his early professional career he delivered numerous lectures abroad—in Europe and in England. His subjects usually referred to photography: daylight and artificial lighting, methods of development, tones and intensifying. Later, brought on by the World War, he devoted much of his time to the perfection of radiographic technique, particularly the

standardization of the development of radiographic films. From 1918 until the end of his brilliant career he contributed untiringly on the many questions confronting the technical side of photography and radiography. Contributions pertaining to the production of instantaneous radiograms of the chest can be found at the Academy of Science at Barcelona and at Acta Radiologica at Stockholm.

In appreciation of the valuable achievements of such an earnest worker, Nahum E. Luboshez was awarded in 1920 the medal of the R. P. S. for radiography. Later in the same year he received a Plaque for Radiography at the Northern Photographic Exhibition at Liverpool, the highest recognition that could be bestowed on one who had constantly striven to advance his chosen art. Achieving recognition in the two fields towards which his efforts were constantly directed, Nahum E. Luboshez wins the distinction of the greatest modern contributor to artistic photography and radiographic technique.

#### United States Civil Service Examination

THE United States Civil Service Commission announces the following open competitive examination:

Junior Medical Officer  
Assistant Medical Officer  
Associate Medical Officer  
Medical Officer

#### Senior Medical Officer

Applications for the positions listed above will be rated as received until December 30. The examinations are to fill vacancies in various branches of the government service.

For positions in the Departmental Service at Washington, D. C., the entrance salaries are: Junior medical officer, \$1,860 a year; assistant medical officer, \$2,400 a year; associate medical officer, \$3,000 a year; medical officer, \$3,800 a year, and senior medical officer, \$5,200 a year. Advancement in pay may be made without change in assignment up to \$2,400 a year for junior medical officer, \$3,000 a year for assistant medical officer, \$3,600 a year for associate medical officer, \$5,000 a year for medical officer, and \$6,000 a year for senior medical officer.

For positions in the field services appointments may be made at the salaries stated above or at higher or lower salaries, the entrance salary depending upon the qualifications of the appointee as shown in the examination and the duty to which assigned.

Competitors will not be required to report for examination at any place, but will be rated on their education, training and experience.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil service examiners at the post office or customhouse in any city.

## ABSTRACTS and REVIEWS

#### CUTANEOUS SYSTEM

*The End Results in the Roentgen Ray Treatment of Cutaneous Cancer.* HENRY H. HAZEN, M. D., and EUGENE R. WHITMORE, M. D., Am. J. Roentgenol., 13:144-157, February, 1925.

THIS report is based upon observations made from the study of some 200 private cases of basal cell carcinoma, extending over a period of ten years, that have been thoroughly treated by roentgen ray. Of these, 160 have been followed over periods varying from one to eight years. The results of these observations are demonstrated in tabular form.

1. Of selected cases, 84 per cent of basal cell carcinomas were cured. Of the unselected cases, 93 per cent were cured.

2. Of the prickle cell cancers, 45 per cent were cured.

3. Of the cancerous glands, 41 per cent were cured.

4. Of the recurrences, 94 per cent occur in the first year. There is a rather high percentage of recurrences when only one or two treatments are given.

5. Basal cell carcinoma occur more frequently in men than in women; and the results ob-

tained in women are a little better than those obtained in men.

6. The age of the patient, although it may be a criterion for the development of cancer, does not affect the result.

7. Early lesions give better results than do old lesions; and small lesions give better results than do large lesions.

8. Deep ulcers or nodules do not give as good results as other types of lesions.

9. Patients previously treated with roentgen ray or radium yield about 50 per cent cures.

10. In the treatment of these conditions, more than one or two treatments should be given; but too heavy treatments should be avoided. This irradiation should reach well around the edges of the growth as well as to its depth. There is more use in mixed doses. A  $1\frac{1}{2}$  unit dose is as effectual as a  $2\frac{1}{2}$  unit dose. The action of the rays is obtained in the following manner: cancer cells are directly killed; the vitality of the group of cancer cells is so lowered that the bodily resistance overcomes them; the local increase in the defensive power of the host results in a lymphocytic infiltration and an increase in the production of antibodies.

11. Irradiation of cancer in cartilage or in scar tissue is futile because of the impossibility of the lymphocytic infiltration and the bodily reaction.

12. The causes of failures are, therefore: deep invasion of cartilage; poor cooperation; localization in scar tissue and previous irradiation.

*The Treatment of Skin Cancer by Electrocoagulation in Conjunction With Quartz Light Therapy.* RAY C. LOUNSBERRY, M. D., Missouri State M. J., 22:15-16, January, 1925.

THE technique employed by the writer in the treatment of skin cancer by electrocoagulation is the same used by all electrotherapists—the transmission of a D'Arsonval current through a sharp pointed aluminum needle, continually plunged into anesthetized areas until they are coagulated.

The writer considers this method as the most satisfactory method of destroying benign, semimalignant and early malignant growths. This form of treatment has been used by many dermatologists with a vast amount of real success. In the mind of the author, when patients learn that a technique has been developed which at a minimum of expense can produce good results, they will likely apply for treatment earlier and thus so many late cases with

extensive destruction of tissue will be eliminated.

*The Treatment of Nodular Vascular Nevi by X Rays.* DR. F. BARJON, Mediein des Hôpitaux de Lyons, France. Am. J. Physical Therapy, 1:545-549, March, 1925.

IN the opinion of the author, radiotherapeutic treatment of vascular nevi should never be undertaken for a plain or flat nevus. This treatment should be reserved entirely for nodular nevi or angioma.

The radiotherapeutic treatment of a nodular nevus should always be applied early, as soon as the tumor manifests a tendency to spread—in the first six months by preference. Early infancy is not a contra-indication to the treatment. On the contrary, there are numerous advantages in instituting early treatment.

The treatment, although it may here be laid down in a cut and dried outline, must be varied with the indications and contra-indications demonstrated by the individual patient. One should not have any desire to hurry. Large doses should be eschewed—never more than four hours applied. Three successive doses of four hours separated from each other by three or four weeks, is the customary rule for the treatment of the ordinary run of vascular nodular nevi, represented by little projecting tumors, superficial and well localized. It is this type of tumor that is the most frequent.

In this treatment naked rays, not filtered rays, of a moderate penetration (No. 5 or 6 Benoist) appear to be suited to the majority of cases.

*The Roentgen Ray Treatment of Various Dermatoses.* MAURICE BROWN, M. D., Arch. Dermatol. & Syph., 2:764-767, June, 1925.

"WITH the perfection of the accuracy of dosage of the roentgen ray in the treatment of diseases of the skin, there has been added to the therapeutic armamentarium of the dermatologist the most valuable agent in the history of this specialty. A large number of dermatoses that in former years stubbornly resisted all method of treatment now lend themselves quite readily to properly applied doses of roentgen rays.....

"The indirect method of computing dosage was used. We employed the mathematical equation—spark gap multiplied by time multiplied by the amperage, divided by the square of the distance.....Our dosage varied according to the disease, but the first dose in all conditions, excepting when destruction or dep-

ilation was desired, was always one-fourth skin unit to test the tolerance of the skin, and then subsequent doses varied between one-fourth skin unit weekly and one-half skin unit every two weeks."

In the treatment of acne vulgaris, one-fourth unit was used in nine cases, one-half unit in 26. Of the 36 cases treated, 20 were cured and 16 markedly improved. Verrueae were also found to respond favorably to the roentgen ray. In tinea tonsurans the results were perfect, treating the entire scalp at one sitting, giving each of the five areas a skin unit without screening, except the face, ears and neck. Results were also favorable in the treatment of superficial epithelioma of the basal cell type, pruritis, ringworm of the nails and many other forms of dermatoses. Eczema responded brilliantly to the roentgen ray. Using the one-half unit dose, a greater percentage of cures was obtained and the percentage of relapses was less using the one-half unit method by one to three. However, twice as long was required by the one-half unit than was required by the one-quarter unit.

As a general rule, the author advocates the use of the one-half unit dose in dispensary work and the application of the one-quarter unit method in private practice. The results that were obtained by both methods were satisfactory.

*Chronic Roentgen Ray Dermatoses as Seen in the Professional Man.* H. N. COLE, M. D., J. A. M. A., 84:865-874, March 21, 1925.

CHRONIC roentgen ray dermatoses are those characteristic changes of the skin, seen especially on the uncovered parts of workers exposed to a greater or lesser degree, and without protection, to the action of the roentgen ray. The changes are productive in character macroscopically, but degenerative in character microscopically. The condition obtained results from a sclerosis of the blood vessels supplying that area. The glandular elements of the corium disappear, the corium becomes much thickened, telangiectases replace the lost blood supply. The epidermis begins its proliferation, disregarding the limitation of the basement membrane, taking on a malignant appearance.

The above condition probably exists in physicians and technicians much oftener than literature would anticipate. Out of nine cases reported by the author, a clinical diagnosis was made in six of malignant degeneration,

and three proven microscopically. In many of the conditions, the physicians treated themselves, which consisted in the use of quartz lamp, carbon dioxide snow, electrocoagulation, surgery, and in some cases radium and roentgen ray was administered. In most of the cases the treatments instigated were successful; however, the best treatment is prophylaxis—adequate protection being an essential consideration for those who use fluoroscopes, radium and roentgen ray apparatus.

*Lower Voltage X Ray Therapy.* F. W. H. TAYLOR, M. D., Radiol. Review., 2:98-100, 1925.

IN this article the author briefly mentions some of the lesions of the skin, its appendages and that portion of the human body enveloped by the skin wherein the lower voltage x ray is being used. This general heading the author subdivided into five parts:

1. Inflammations of the skin; furuncles, carbuncles, herpes, eczema, psoriasis, etc.
2. Hypertrophies: keratosis, verruca, and naevus pigmentosus.
3. New Growths: keloids, rhinoscleroma, tuberculosis and epithelioma.
4. Sweat Glands.
5. Sebaceous Glands: acne vulgaris, sycosis barbae, hypersecretion, ringworm, etc.

Other conditions are mentioned in passing: adenitis of various causative factors, hypertrophied thymus, hyperthyroidism and breast cancer.

This paper is an outline of some of the more important conditions that are amenable to lower voltage x ray therapy.

#### GASTRO-INTESTINAL SYSTEM

*Radical and Conservative Electrothermic Treatments of Tonsils.* A. I. ARNESON, M. D., Am. J. Phys. Therapy, 1:550-555, March, 1925.

THE author divides his discussion into three parts—radical electrocoagulation of the tonsils, radical electrode desiccation of the tonsils and conservative electrothermic treatments of the tonsils.

*Electrocoagulation*, the author believes, will never supersede surgical tonsillectomy, but will serve rather to be used in selected cases. Its advantages are numerous: avoids danger of bleeding, no metastasis of infections, minimizes shock and does not affect the patient's voice. It is to be recommended in very old patients, hemophiliacs, cardiac cases, virulently

infected tonsils and in malignancies of the tonsils, fauces, tongue, etc. Its disadvantages are: pain and edema following treatment and the possibility of applying more than one treatment.

*Electrodesiccation*, by means of the Oudin current, is of great value in stopping intractable hemorrhage following surgical removal of tonsils. Two techniques may be employed. In the first, the tonsillar area is swabbed frequently for twenty minutes with a 10 per cent cocaine and the tissue rapidly blanched by the electric needle. The point of the needle is then inserted into the tissue, the current turned on with sufficient strength to produce a slight explosive effect near the point. This is repeated over the entire surface as before, then another series of still deeper insertions of the needle is done, and so on, until it is felt that the entire tonsillar mass has been desiccated. The other method is to increase the current and duration of the application until the tissue is carbonized. It may then be curetted out and the method repeated on the deeper structures.

*Conservative electrothermic* methods in the treatment of tonsils consists in the application of the ultra violet rays and the high frequency current. The action of either method the author attributes to the production of a non-specific inflammation, a means by which the leukocytic infiltration is accomplished and an acceleration of the normal activity of nature results.

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*The Diagnosis and Medical Treatment of Gastric and Duodenal Ulcer.* Wm. H. RENDLEMAN, M. D., J. Iowa State M. S., 15:363-367, July, 1925.

THE surgeon demonstrated the existence of ulcer when certain symptoms are presented. With the aid of the radiologist, one is able now to diagnose with precision the presence and location of ulcers, the symptoms of which may give only a suspicion of ulcer.

In the mind of the author, the modern diagnostician must also be an expert in roentgen ray interpretation, and must either do his own work or work in close cooperation with the radiologist so that he can be present at every fluoroscopic examination. "The one most capable of making a correct x ray diagnosis is the clinician with a large amount of stomach work who has done or watched the x ray examination and followed the cases requiring surgical treatment to the operating table. The

fluoroscope is to me most useful and should be supplemented by a few plates."

"The accurate diagnosis of ulcer necessitates the determination of the presence and nature of complications. Among these, pyloric obstruction is the most common. Pyloric obstruction means duodenal obstruction, as it is not very common for the gastric ulcer to involve the pylorus. This complication may be considered when:

"1. Vomiting of food eaten the day before or of large amounts of gastric juice.

"2. Removal of a seven hour meal showing food.

"3. A six hour residue after the barium meal.

"4. Visible peristaltic waves.....

"Chronic perforation, hour glass stomach and perigastric adhesions can be diagnosed by the x ray.....Secondary carcinoma should be suspected when the x ray shows a large crater, when there is continuous presence of blood in the stools and distress that is not relieved by medical treatment."

The value that the author places upon the diagnostic use of the roentgen ray may be summarized in the following statement: "The direct x ray signs, when present, are as pathognomonic of ulcer as a positive Wassermann is of syphilis."

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*Surgical Indications Arising During the Medical Management of Gastric Ulcer.* SARA M. JORDAN, M. D., Boston M. & S. J., 192:1106-1117, June, 1925.

MOST ulcers can be managed medically. During the medical management there should be roentgen rays or at least fluoroscopic examinations made to note the changes taking place. During the medical regime there are two dangers to combat: (1) An excess of secretion of HC<sub>1</sub>, which usually gives most trouble at night, and (2) an alkalosis as the result of administration of NaHCO<sub>3</sub>.

The x ray defects which are unchanged by management, fall into two groups: (1) Cicatricial deformities of healed ulcers, and (2) defects due to malignancy and therefore unchanged by medical management. The cicatricial deformities of the healed ulcer, such as the hour-glass stomach, are an indication for surgery only when they cause symptoms of obstruction. The deep incisura of the active ulcer on the gastric side, which may resemble an hour-glass deformity in the x ray, is usually released as the acute inflammatory stage

of the ulcer subsides under management. In duodenal defects, where malignancy need hardly be suspected, it is sufficient to note the decrease in spasm of the antrum and in hyperperistalsis, the secondary evidence of activity and a disappearance of tenderness over the defect during fluoroscopy.

There are two main emergencies that threaten life in the cases *not* under treatment, viz., massive hemorrhage and perforation.

*Histological Changes in the Gastric Mucosa of the Dog Following Irradiation.* ALDEN B. DAWSON, Ph. D., Am. J. Roentgenol., 13:320-326, April, 1925.

THE material which forms the basis of the paper was obtained from Pawlow pouch dogs used in the study of the physiological effects produced by exposure to the roentgen rays.

The first reaction noted in the exposure of the Pawlow pouches to the roentgen rays was a hypocholelorydria, which was followed by an achlorhydria. The dose which was found necessary to produce this effect on the acid secretion was from 155 per cent to 200 per cent of the dog erythema dose. The reduction and eventual disappearance of acid from the gastric secretion was associated with definite injury to the gastric mucosa.

All the secretory cells received injuries. The greatest damage was done to the chief cells, which early were noted to undergo cytolysis, while the parietal cells were not so easily broken down. The destruction of the chief cells resulted in the loss of the secretion of pepsin from the gastric juice and the breaking down of the parietal cells caused a deficiency in the production of hydrochloric acid. Persisting parietal cells which showed no histological change were unable to produce the hydrochloric acid. The most striking injury was inflicted upon the superficial portions of the mucosa.

The pathological changes noted, included a passive hyperemia of the mucosa, while no infiltration of the white blood cells, migration of fibroblasts, nor production of fibrosis was found. No phagocytosis was observed and as the necrotic tissue sloughed regeneration occurred from below. In this regenerated mucosa, normal histological structures were restored, but the thickness was markedly reduced. The parietal cells, however, showed a marked alteration in staining and in nuclear structure.

In the opinion of the observer, the delay in healing in these injuries was probably due to the sluggish reaction of the fibroblasts, since "there can be no epithelial repair until a healthy connective tissue substratum is established."

*Diverticulitis of the Large Intestine.* JOSEPH W. LARIMORE, M. D., J. Missouri State M. A., 22:129-133, April, 1925.

IN the diagnosis of diverticulitis, unless there is a palpable mass, and such is usually not the case, characteristic acute tenderness of active inflammation may be the only sign. Blood in the stool complicates rather than aids in the diagnosis. Proctoscopic examination, as a rule, will give no positive help unless obstruction or malignant degeneration has occurred that will reach the proctoscope.

In characteristic cases, the clinical diagnosis of diverticulitis may be fairly certain, but the x ray in the majority of cases will give conclusive evidence by demonstrating diverticulosis.

"The x ray demonstrated diverticulosis by the filling and visualization of the accessory pockets by ingested barium sulphate or bismuth salts..... The filling of diverticula may be characteristic inasmuch as fecal concretions contained in the pocket so influence the barium filling that the form of the barium shadow about the nonopaque fecolith is characteristic. A barium residuum filling the pockets after the bowel lumen has been emptied clearly demonstrates the condition. Opaque material may persist in the pockets over weeks or longer. Demonstration of the pockets accessory to the lumen of the bowel by the barium enemas is conclusive."

#### GENITO-URINARY SYSTEM

*Radium in Gynecology.* GEORGE GELLHORN, M. M., J. Missouri State M. J., 22:139-140, April, 1925.

THE principal field for radium in gynecology is in the treatment of fibroids and cancer of the uterus. In these conditions, radium exerts its influence in two ways: (1) Exerts a deleterious effect upon the follicle cells in the ovaries, producing a bloodless castration; (2) influences the tumor cells in such a way that the nuclei degenerate and the cell bodies pass through a sort of autolytic process, which probably bears some resemblance to the involution after childbirth.

In a realization of these two actions, one may determine the applicability of radium:

1. In women over forty years with fibroids of small or moderate size, radium is the method of choice.

2. In young women in the second or third decades of life, where everything should be done to preserve the uterus and childbearing ability, radium is contra-indicated.

3. In sacromatous degeneration in the fibroid, or in most malignancies, radium and surgery hold an equal relationship.

4. In patients complaining of bleeding, in the preclimacteric, radium is the sovereign remedy.

*Ureteral Variations, With Associated Kidney Changes.* Douglas J. ROBERTS, M. D., Am. J. Roentgenol., 13:353-359, April, 1925.

VAGUE abdominal symptoms have many times been traced definitely to pathological changes in the urinary tract. A consideration of the anatomical relations of the ureters will suffice to illustrate the numerous possibilities for the development of pathology. Not only the normal points of narrowing, but close association with neighboring structures, predispose the ureters to pathological alterations.

It is becoming an unwritten law among diagnosticians that ureteral pathology be ruled out before a definite diagnosis of some abdominal disorder is made. Roentgenography is the procedure regularly followed in the authors' clinic, since they feel that roentgenography is of relatively minor value. As a preliminary, a stereoscopic examination is made following the introduction of opaque catheters. This step is particularly useful in differentiating small shadows which lie apparently tangent to the catheter on the flat plate, but which when stereoscoped appear to be on an entirely different plate. Both catheters are introduced for a distance of from 20 to 30 cm., then during injection are slowly withdrawn to a distance of 5 to 10 cm. from the bladder, which brings them downward well below the pelvic brim, or better, to the uretero-vesical junction. Thus valuable evidence such as strictures, kinks, diverticula, multiple ureters, fistulous tracts and tumors may not be overlooked. Furthermore, it may be decided that the shadows which lie apparently close to the ureters are really included in the filling solution.

In a series of 941 examinations made by

the author in the last four years abnormal ureters showed: (1) strictures, (2) obstructing calculi, and (3) a relatively small group where the uretero-vesical valves are held open and patent.

*Roentgen Ray Treatment of Uterine Fibromyoma and Uterine Hemorrhage.* I. S. TROSTLER, M. D., F. A. C. A., F. A. C. P., Radiol. Review, 1:44-49, 1924.

ROENTGENOTHERAPY is considered by the author as the treatment par excellence for uterine hemorrhage and uterine fibromyoma, unless there is some definite contraindication, because:

1. It is safer and pleasanter for the patient.  
2. It is applicable in cases which are a bad surgical risk.

3. The patient does not have to enter the hospital or lose any time.

4. The menopause, when induced by the treatment, is less sudden than that produced by surgical interference and is accompanied by less shock.

5. The percentage of cures in properly selected cases is as great or greater than in any other type of treatment.

It is the contention of the author that roentgenotherapy should only be administered by graduates in medicine of adequate training in the specialty of radiology, and should never under any circumstances be administered by lay technicians.

*Mumps: A Preliminary Report of the Effect of Diathermy in Testicular Metastasis.* H. L. FOUGEROUX, M. D., J. A. M. A. 84:1117, April, 1925.

IN a short preliminary report of the author, who is a member of the Medical Corps at the Great Lakes, Ill., results of the efficacy of diathermic treatments in the metastatic cases involving the testes in 100 cases admitted to the U. S. Training Station at the Great Lakes, is noted. Of the 100 cases admitted, 20 patients developed testicular complications, characterized by the usual signs. As discovered these patients were treated along lines in vogue in the urological department for handling gonorrhreal epididymitis and allied disorders.

"A Corbus clamp is used with the diathermy machine. The treatment covers a period of one-half hour each day, the precautions must be taken to prevent the elaboration of too much energy, which might accomplish one of

the objects it is endeavored to prevent—sterility. Invariably the results obtained were most satisfactory. Practically all pain subsided during the first treatment, and the progress of the inflammatory changes are arrested. Resolution was greatly hastened in all cases. Twenty-four hours after the first treatment the clinical picture completely changed. With suitable apparatus, treatment of the parotids, or primary foci, should cut short the disease before metastasis can occur."

*Air Cystograms to Demonstrate Prostatic Enlargements Which Protrude Into the Bladder.* EDGAR G. BALLINGER, M. D.; OMAR F. ELDER, M. D., and WM. F. LAKE, M. D., J. Med. Ass. Georgia, 14:99-104, March, 1925.

CONSIDERABLE information may be obtained in determining the extent of the involvement of the surrounding tissues by the degree of projection into the bladder. Projection of masses into the bladder can for the most part be demonstrated by the air injection method. None of the soft tissues can be shown except those which project into the bladder cavity and are more or less surrounded by air to give the necessary contrast in density.

The method employed by the author may be detailed as follows: The patient is given a cathartic, preferably castor oil, fifteen or eighteen hours before the exposure is made and a soap suds enema about an hour before. Just before the examination he is requested to empty the bladder as completely as he can. He is then placed upon the Bucky Diaphragm in the dorsal position; one ounce of a 1 per cent solution of novocain or alypin is injected with a urethral syringe through the urethra into the bladder, withdrawing the residual urine, which is measured. The type of the catheter to be employed naturally has to be varied to meet the difficulties encountered in its passage. The catheter, when passed, is fixed in place with adhesive strips to prevent its slipping out as the patient turns over. A rubber band is placed around the penis to keep the air from escaping from around the catheter.

The patient is now placed face downward directly in the center of the Bucky Diaphragm, care being taken that he is flat and that the spine is straight. The buttocks are separated as far as possible and sufficient compression is made with a canvas band to hold them apart. A Murphy drip, loosely packed with sterile

cotton, is connected to the tubing. This is for the purpose of filtering the air injected into the bladder, but the necessity of this procedure is doubted. Air is then injected into the bladder with a bulb or piston syringe until the infiltration causes some discomfort, or about as much air as a 100 c.c. syringe will hold. The amount tolerated by the patient depends, as previously stated, on the degree of cystitis or the presence of calculi and upon the overdistention produced by the residual urine. The patients bear it best who have the largest amount of residual urine.

The roentgen ray machine, having been previously set and the tube adjusted with a 20 degree angle so as to direct the rays upward through the pelvic ring, the exposure is made. The air is allowed to escape through the catheter, which is then removed. The time of exposure and the penetration is largely a matter of judgment, much as in demonstrating the kidneys. The medium sized patients are usually exposed with a three and one-half inch spark gap, 20 milliamperes and ten seconds, using superspeed films. With large patients a four inch gap was used.

It should be borne in mind that the object is to show a shadow of soft tissues in a medium of air, and the overexposure will impair accurate results.

#### RESPIRATORY SYSTEM

*Heliotherapy in the Treatment of Tuberculous Laryngitis.* A. M. FORSTER, M. D., and S. J. CHAPMAN, M. D., Colorado Med., 22:90-93, March, 1925.

TUBERCULOUS laryngitis is a peculiar surface lesion. Over the framework of cartilage a comparatively thin mucous membrane is stretched. Consequently these lesions must necessarily be superficial. Because of this fact, sunlight can be rather easily applied directly to the lesions, "and if there is any virtue in heliotherapy, any direct virtue, why then we certainly should get it in tuberculosis of the larynx."

In the treatment of this condition, the author employs heliotherapy, together with absolute rest of the voice, and direct applications of whatever solutions are considered necessary.

For the application of heliotherapy, the rays were reflected into the throat by means of a mirror. Since the actinic rays are absorbed by glass, an alloy mirror of aluminum and magnesium was perfected. "The apparatus

consists of a standard, which is fastened to the back of the chair, or to a stand, which has two mirrors, one made of an alloy of aluminum and magnesium and another a simple glass mirror in which the patient sees just where he is directing the ray. This mirror, this alloy mirror, catches the ray from the spot and throws it into the pharynx. The patient then uses this small laryngoscope, which is made of the same metal, this alloy and, placing it into the back of the pharynx, reflects the light directly upon the lesions in the larynx. Considerable adjustment is necessary at first until the patient learns the technique." The authors teach their patients the method of application, claiming that their observation of the lesions, their improvement and retardation, teaches them of the severity of the malady and serves to sufficiently induce them to carefully follow instructions.

In the discussion of the article, Dr. F. R. Spencer of Boulder, Colo., emphasizes the distinct advantages of heliotherapy as:

1. This method of treatment can be used by most patients, after a little instruction, without the help of a physician or nurse. It is, therefore, almost akin to occupational therapy and is a diversion.

2. It is much less expensive than some of the other methods of treatment, which, from a patient's standpoint, is very desirable, especially when treatment of different kinds must be carried out over a period of months or years. However, this method of treatment should not be used to the exclusion of vocal rest, the electric cautery, lactic acid, etc., as the authors have mentioned. We are using heliotherapy as it is used at Cragmoor Sanitorium.

3. It can be used by the internist, by the family physician, who is not always expert in other methods of laryngeal treatment.

The disadvantages of heliotherapy, as outlined by the same author, are as follows:

1. Patients in their natural eagerness, in their desire for a quick cure, are apt to expose the larynx to the sun's rays too often and for too long a time, with the result that the laryngeal and pharyngeal mucosa are sunburned.

2. Personally, I have not seen any benefit from heliotherapy in late cases of tuberculous laryngitis, but this criticism applies to most of the other methods of treatment for the advanced laryngeal involvement. In early cases with slight involvement it is excellent.

*Arachidic and Other Forms of Vegetal Bronchitis.* CHEVALIER JACKSON, M. D., Se. D.; GABRIEL TUCKER, M. D., and LOUIS H. CLERF, M. D., Atlantic M. J., 28:506-508, May, 1925.

WITH a history of choking and gagging, the audible slap on opening the mouth, the physical signs of bronchial obstruction, and the roentgenological evidence of obstructive emphysema or obstructive atelectasis, followed later by drowned lung, the diagnosis of vegetal bronchitis is made by the authors. Only one method of treatment is considered worthy of a moment's consideration: bronchoscopy, removal of the vegetal foreign body and aspiration of the secretions.

*The Effects of Ultra Violet Therapy in Chronic Bronchitis in Children.* H. HARRIS PERLMAN, M. D., P. D., Therap. Gazette, 49:387-391, June, 1925.

FIFTEEN cases of chronic bronchitis were treated by means of the artificial light by the writer. The patients treated were infants and children. Of this number, eight were due to lesions other than those caused by the Koch bacillus—seven were definitely tuberculous. All presented coughs of sufficient duration to term them as chronic. Prior to ultra violet therapy all patients received medication of one nature which is usually prescribed for chronic bronchitis. As a result of these applications the author offers for consideration the following conclusions:

1. Ultra violet medication as is produced by the quartz lamp is a useful adjunct in treating chronic bronchitis in children.

2. Improvement probably occurs by the destructive action of the rays upon the micro-organisms; the rays being absorbed by the blood stream through the capillaries. Indirectly the patient is restored to a state of health by the phagocytic action of the leukocytes and endothelial cells. The rays improve the general circulation and increase the oxygen-carrying power of the blood.

3. Artificial heliotherapy is not a panacea for all medical entities. It has a distinct place in the field of applied therapeutics for certain well defined ailments, not benefited by the usual means of treatment at command.

4. In the series of patients treated for chronic bronchitis by the light, it formed a complete method of treatment, and the results justify its further study and use.

*The Management of Pregnancy in the Presence of Pulmonary Tuberculosis.* HARVEY BURLESON MATTHEWS, M. D., F. A. C. S., Long Island M. J., 19:152-153, April, 1925.

THE active treatment of pregnancy complicated with pulmonary tuberculosis naturally divides itself into (1) the general and (2) the obstetrical.

The general treatment of pulmonary tuberculosis in the pregnant woman does not differ in the least from the general treatment in those not pregnant.

The obstetrical treatment includes (1) the question of the intervention of the pregnancy; (2) the method by which the interruption is best accomplished; and (3) the best method of delivery at or near full term.

It is in the desperate cases that roentgen therapy plays its important role. After a simple dilation and curettage or anterior vaginal hysterotomy with removal of the fetus, terminating the pregnancy usually in the period prior to the 16th week, radium or x ray is applied in sufficient amounts to produce sterilization—after the general condition of the patient has improved. From the 16th to 28th week, artificial interruption should very rarely be undertaken, except in the active cases where the patient is very rapidly becoming worse. If intervention is decided upon, vaginal hysterotomy, under sacral or local anaesthesia, with later sterilization by radium or x ray, is the procedure of choice.

#### *Bronchiectasis: Its Diagnosis and Treatment.*

R. J. CALLANDER, M. D., Southwestern Med., 9:226-229, June, 1925.

X ray has never been of any great value in the diagnosis of bronchiectasis, except in a differential manner in an attempt to rule out tuberculosis by the clear apices. The author believes that this may be due to the limited ability to interpret the lower lung fields. The study of the lower left lung field is always difficult because of the interfering cardiac shadow. The method of injecting the trachea with an opaque material should, the author believes, be of great benefit in helping to diagnose bronchiectasis and also, what is more important, to determine the extent of the process. This injection has in about every case, according to the reports of other workers, been of value therapeutically in decreasing the expectoration. It has been a great help both as an aid to diagnosis and treatment in the hands of the author.

*Treatment of Pneumonia With Diathermy.* HENRY H. KESSLER, A. B., M. D., J. M. Soc. New Jersey, 22:170-173, May, 1925.

THE successful role played by physiotherapy in the reconstruction and physical rehabilitation of our disabled soldiers and sailors following the World War is a matter of medical and military history. Physiologic effects of diathermy noted at this time disclosed:

1. The production of an intense local hyperemia.
2. Increase of lymph circulation.
3. Leukocytosis.
4. Antibacterial effect on the virulence of the following organisms: Gonococci (especially in gonorrhreal arthritis), cholera vibrio, pneumococcus, streptococcus and staphylococcus showing no change in virulence.
5. Sedative effect.
6. Increased activity of organs, such as liver, kidney and secreting glands.

In the literature there is reported about 67 cases. The cases are too few and the time is too early to form any estimate of its permanent therapeutic value, but sufficient data has been collected to indicate that it may become an important adjunct to the treatment of lobar pneumonia. It has not shortened the period of the illness in these series, neither has it prevented the occurrence of relapses. In practically every case, however, the temperature has fallen by lysis, and no case to whom the treatment with diathermy was started before the third day was lost.

The technique employed by Broeser of Hoboken was outlined as follows: Two electrodes of 22 gauge Crooke's metal, flexible and easily molded to the body, 4 by 7 inches in size, were placed one anterior and one posterior to the affected lobe. The skin and the electrodes were first soaped with ordinary soap and water. One of the electrodes was kept in place by the weight of the patient's body and the other was held in place by an assistant or by a light sand bag. The electrodes were attached to the poles of a d'Arsonval high frequency circuit. The current was gradually increased until 2,000 ma. was given. At the end of the treatment, which lasted twenty-nine minutes, the current was gradually turned off. One or two treatments a day were given.

#### OSSEOUS SYSTEM

*Metastatic Manifestations of Hypertrophroma in Bone.* RICHARD DRESSER, M. D., Am. J. Roentgenol., 13:342-353, April, 1925.

**H**YPERNEPHROMA metastases to bone are rare. There is often no sign of renal involvement, the metastases being the first symptom which brings the patient to the physician. The metastases, when they do occur, are usually multiple, but may be single.

Clinically, these tumors may give an expansile pulsation and may be mistaken for aneurysm. Roentgenologically, the process is practically always a destructive one.

The location of metastases conforms to the anatomical distribution of the red marrow in the majority of cases.

By way of treatment, palliative results may be expected from high voltage roentgen irradiation in massive doses.

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*A Case of Bone Giant Cell Sarcoma of the Ulna.* CHARLES A. PFENDER, M. D., J. Am. A. Med.-Phys. Research, 2:30-32, December, 1924.

**I**N the eradication of this malady the author applied roentgen therapy over the volar surface. Five milliamperes of current was used for thirty minutes with 0.25 mm. copper, 2 mm. aluminum and 4 mm. of leather as filter, a 9.5 inch spark gap and a 12 inch focus skin distance. Three days after the initial treatment a similar treatment was applied on the flexor surface of the distal end of the ulna. Shortly after the roentgen ray treatments a surgical curettage was done. Subsequently radiological studies demonstrated new bone formation and no evidence of abnormal tumor shadows.

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*The Antirachitic Activation of Foods and of Cholesterol by Ultra Violet Irradiation.* ALFRED F. HESS, M. D., J. A. M. A., 84:1910-1913, June 20, 1925.

**B**EFORE the Section of Pathology and Physiology at the Seventy-sixth Annual Session of the American Medical Association, held recently at Atlantic City, N. J., Dr. Alfred F. Hess from the Pathological Laboratory of Columbia University of Physicians and Surgeons, read the above paper, which summed up and interpreted the experimental data that has been offered for consideration up to this time.

It is a generally accepted fact that ultra violet irradiations from the sun or the mercury vapor or carbon arc lamps will protect animals as well as infants from rickets. Experimentation has shown that the chemical substance which was activated by the rays was

the cholesterol in animal foods, or its counterpart, the phytosterol vegetable foods. This aspect of the subject, therefore, narrowed itself down to the consideration of the interpretation and importance of this activation of cholesterol and of phytosterol.

It has been proven that cholesterol is present in almost every animal cell and phytosterol is present in almost every vegetable cell. It would seem that this relative constancy would indicate a definite relationship of these sterols to the functional activity of the organism, yet no such relationship has been demonstrated, neither physiologically nor pathologically. The disorders of nutrition with which cholesterol has been associated are numerous, but in none of the conditions has the association been found to be constant or essential.

An organ exceptionally rich in cholesterol is the epidermis. It was only natural to immediately raise the question whether or not the prevention and cure of rickets was not due to an activation of the cholesterol contained within the epidermis. Experiments were carried out by the author to furnish information in regard to this question that resulted in the conclusion that it would seem quite unnecessary to account for the effect of irradiation by the hypothesis that the skin as an organ of internal secretion.

Further experiments on the activation of crystalline cholesterol resulted in its activation as the result of prolonged subjection to the ultra violet light. This fact would tend to indicate that there is a therapeutic limit to ultra violet light just as there is to any other therapeutic drug and that this question should be seriously considered in the application of irradiation to clinical medicine. The question is immediately raised by the author—is it possible that too long irradiation with artificial sources of ultra violet rays may tend to counteract or nullify their beneficial effect? It is not possible at present to state whether or not harmful results may be produced by prolonged irradiation. It is well, however, to remember that we are dealing with a form of energy that is able to effect remarkable changes in the constitution of the blood and the bones, and that these rays should not be applied in indiscriminate amount. From some clinical experiments gathered some years ago when ultra violet irradiation was first introduced and when doses of greater intensity were employed, it would seem quite possible that prolonged irradiation may decrease im-

munity and open the way to infections of the respiratory tract.

Questioning the conveyance of antirachitic properties of the solar ultra violet rays to the various vegetables consumed by man, the author asserts that continued attempts in his laboratory to prevent the development of rickets in rats by including in their dietary green vegetables, have been unsuccessful. All these green leafed, ricket-producing vegetables, whether they were rich in chlorophyl or etiolated, were endowed with a marked antirachitic potency by means of exposing them to the radiations of the mercury vapor lamp. This difference in effect between solar and artificial irradiation is readily understood when one considers the marked difference in the intensity of the natural and artificial radiations. The radations from the lamp are perhaps thirty or forty times as potent as those provided by the sun, and, moreover, are not subject to the irregularities that are inseparable from meteorological conditions.

In the tables included in the report of the author it will be noted that the best result was obtained with irradiated dry milk, as judged by the roentgenologic picture and the increase of inorganic phosphorus in the blood. This milk was irradiated in thin layers for a period of one-half hour with the lamp at a distance of one foot, and was fed on the day on which it was irradiated.

In conclusion of these above facts, the author states that "an infinite variety of foods can be endowed with antirachitic virtue by means of irradiation; this list includes flour, the various foods prepared from flour and the vegetable oils. It does not seem, however, that the activation of these foods will secure a wide sphere of application in dietetics. The same holds true in regard to enhancing the antirachitic potency of cod liver oil, a suggestion that is frequently made. Although such a result can be brought about by means of irradiation, nothing essential is gained thereby, as the objectionable taste and odor of the oil remain unchanged and the requisite dosage is but slightly diminished.

"The established fact that foods, as well as cholesterol and phytosterol, can be endowed with specific antirachitic potency has, quite apart from any clinical application, decided theoretical interest and value. It demonstrates a definite physiologic process by which ultra violet rays can bring about a change in the tissues and furnishes a chemical basis for

interpreting one of the effects of heliotherapy. What may be the relation of this activation of cholesterol to the broad problem of the nature of vitamins depends largely on our definition of a vitamin. At present the definition is so vague and varied that it would be futile to consider whether a vitamin has been formed by means of irradiating cholesterol. All that can be stated definitely in this connection is that a chemical substance which is ubiquitous in the cells of the body can be rendered specifically curative as the result of exposure to ultra violet irradiations and that a minimal amount—less than 1 mg. a day of this activated substance—suffices to protect experimental animals from the lesions of rickets."

*A Roentgenological Study of the Skeletal Remains of the Prehistoric Mound Builder Indians of Ohio.* HUGH J. MEANS, M. D., Am. J. Roentgenol., 13:359-367, April, 1925.

IT seems that this is the first roentgenological study that has been made of the skeletal remains of the Mound Builder Indians of Ohio.

From the material at hand the same pathological conditions were demonstrated that exist today. It has been clearly proven that syphilis existed and was a fairly common disease.

#### ENDOCRINE SYSTEM

*Effects of Roentgen Rays on the Endocrine Glands.* HARRY BENJAMIN, M. D., J. Am. A. Med.-Phys. Research, 2:32-37, December, 1924.

THE question of influencing the endocrine function has met with widespread discussion. Fundamentally, there are two methods used for this purpose: (1) Surgery in the form of transplantation of glandular tissue and in the form of vasoligation, better known as the Steinbach operation; and (2) the use of the roentgen rays.

Concerning this latter method for influencing the action of the endocrine glands by means of the roentgen rays, there are two diametrically opposed schools. On the one hand, "Professor Holzknecht in Vienna and his school absolutely and radically deny the existence of an x ray dose that will stimulate function and act without destruction. That means x rays always destroy—destroy little in small doses, destroy much in larger doses. Only in very small doses may they be indifferent to the living cells." However, according to the

author, he does not deny the beneficial action of the roentgen ray on the glandular structures. "His explanation is that the gland in certain pathological conditions cannot discharge the hormone properly, but accumulates it in its cells. X rays injure these cells so that they cannot longer hold the hormone. A rather sudden discharge, with the accompanying clinical symptoms, takes place."

The other side of the question is represented by Manfred Fraenkel, in Berlin, "who was the first to call attention to the great value of stimulating radiation in general." He receives the cooperation of Catani of Zurich, who speaks of the short "bio-positive or life-affecting effect of the x rays in contrast to the bio-negative or destructive effect of prolonged exposures."

The author leans toward the latter school, describing his experiences as an endocrinologist, who "has had so much occasion to appreciate the tremendous value of the x ray that I feel sufficiently encouraged to talk about it and recommend its use."

*Imbecility in Relation to Endocrinology.* MAXIMILIAN KERN, M. D., Clin. Med., 32:359-365, June, 1925.

THE author recognized that the roentgen rays are valuable aids in the diagnosis of idiocy. Characteristic pathological changes of the sella turcica are shown on the roentgenogram.

*Is Irradiation a Satisfactory Treatment for Substernal Thyroid?* G. W. GRIER, M. D., Am. J. Roentgenol., 13:327-330, April, 1925.

THE difference between intrathoracic and cervical goiters is the great importance of size in the intrathoracic type. Here, due to the compactness of the anatomical structures in this region, any increase in the size of any one of the many structures impinges upon the neighboring structures and results in a complex of variable symptoms. A hypertrophied goiter, however, results not only in the production of these pressure symptoms, but also produces the hyperthyroid manifestations. The question arises: should one expect the relief of such symptoms from irradiation treatment? No answer can be justly given to cover all conditions.

Much depends upon the type of goiter present. Most intrathoracic goiters are undoubtedly adenomatous, a few are cystic, a few are

colloid and a few are of the exophthalmic type. The symptoms presented can usually determine the type with which one is dealing. Colloid and cystic goiters are entirely unaffected by irradiation. The acute exophthalmic type shows the greatest reduction in the size of all goiters. Adenomata are sometimes markedly reduced in size and other cases seem apparently uninfluenced in this respect. It is, therefore, important to determine the type of goiter present.

"While irradiation offers no particular danger in the application of the treatment, the chances for complete and permanent recovery are obviously not so good as where the mass can be removed. The real problem, then, is whether operation can be successfully performed without risk to the patient. If, after careful examination of the patient and a study of the location and extent of the tumor, the internist and surgeon decide this question in the affirmative, I believe surgery is the treatment of choice. If not, irradiation offers a probability of relief from symptoms in a majority of cases. I believe with the more common use of deep therapy technique in these cases the results will be much better than in the past."

*Enlarged Thymus: Differential Diagnosis and Radium Treatment.* G. W. GRIER, M. D., Atlantic M. J., 28:502-506, May, 1925.

THE incidence of enlargement of the thymus in the newborn and its significance as a pathological entity are subjects of much discussion. But due to the relative frequency of enlarged thymus in cases that show a variety of symptoms, roentgen examination is advised whenever the symptoms seem to suggest any possible involvement. Often a decided enlargement of the thymus exists in newborn babies and that, while it causes no inconvenience in many of these, there are a few of them in whom it will cause serious trouble, or even prove fatal. The number of sudden deaths from enlarged thymus in babies supposedly normal is sufficiently large to consider this condition a potentially serious one whenever found. "Since we do not know which of these babies will develop trouble, or why some do and some do not, the only safe plan to follow is to treat all enlargements as pathological."

By way of diagnosis, the author arbitrarily divides the babies into two groups: (1) Those under two months of age and (2) those over two months of age. In the first group con-

genital syphilis and enlargement of the large vessels are to be considered. In the diagnosis of enlarged thymus in contradistinction to enlarged vessels the increase in the size of the mediastinal shadow and not the displacement of the shadow is the determining factor. In the second group, or in those children old enough to have acquired pathology in the chest, a differential diagnosis must be made between enlarged glands, new growths or collections of fluid or pus in the mediastinum.

By way of treatment of this condition, because of the extreme sensitivity of the enlarged thymus to radiation, it can be very quickly and surely reduced in size. Therefore, the danger in this condition lies in the actual size of the gland, aside from any toxic effects which may also be produced. "While the roentgen ray is widely used for this treatment, I have abandoned it in favor of radium, and for the last four years have treated all my cases in this way. The advantages of radium are that the response to treatment is somewhat quicker and that it can be more easily applied without disturbing the patient. It is very difficult to keep a baby accurately placed under the x ray tube unless it is held by others who are in a certain amount of danger from exposure to the rays or to the high voltage currents. The restraint of the child is also undesirable, as it may precipitate paroxysms of strangulation from the crying and struggling incident to it. The radium may be applied while the child is in its bed without any disturbance and the relief is surprisingly prompt. Often in a day or two the pressure symptoms are gone. For this purpose, I use 100 milligrams of radium, subdivided into 4 capsules of 25 milligrams each and placed one inch apart. The filter used is 1 mm. of brass. The radium is fastened to a block of pitch wood and placed  $\frac{3}{4}$  of an inch from the patient's skin. It is left in position for ten hours. There is no visible change in the skin produced by this treatment. The radium is covered on the outside by lead so that the baby's chin, hands, or arms cannot be exposed by the back of the radium capsules. It is extremely important that radium applied externally should be kept accurately at the selected distance from the skin for the entire time of the treatment, or else the dose will be different from that desired. Radium should never be wrapped in gauze, cotton or other compressible materials and applied to the skin; first, because it is impossible to tell accurately what

distance it is from the skin when it is put on; and second, because it will not stay at that distance, but will approach nearer as the soft material between it and the skin becomes compressed by the movements of the patient, and unpleasant consequences may result. One radium treatment is usually all that is necessary to relieve these cases, but occasionally it has to be repeated in six or eight weeks."

*Benign and Early Malignant Neoplasms of the Mammary Gland.* DONALD MACRAE, JR., M.D., F. A. C. S., J. Iowa State M. S., 15:358-363, July, 1925.

**I**N the treatment of early malignant growths of the mammary gland, the author mentions x ray only to condemn its use. His observations have been to the effect that rapid and frequent metastases, without local recurrence, is more apt to occur after x ray treatment than without.

Until better results can be shown the author wishes to go on record against the use of the shot gun x ray—before or after the radical surgical operations for carcinoma of the mammary gland in its early stage.

It is his belief that radical surgery in early cases in the hands of competent surgeons shows a record of from 60 to 75 per cent cures.

## RESEARCH

*Irradiated Foods and Irradiated Organic Compounds.* HARRY STEENBOCK, Ph. D., and AMY L. DANIELS, Ph. D., J. A. M. A., 84: 1093-1097, April 11, 1925.

**T**HE authors summarize their experimental conclusions. By exposing such food materials as wheat, rolled oats, corn, hominy, cream of wheat, shredded wheat biscuits, corn flakes, patent wheat flour, cornstarch, meat, milk and egg yolk to ultra violet light, they can be endowed with antirachitic properties. That such a wide variety of foods can be thus affected appears to be due to the fact that practically all naturally occurring foods contain lipoidal constituents of the nature of sterols, which can carry this activation. Cholesterol, for example, as obtained from grain is entirely inactive, but after exposure to ultra violet light becomes rickets-preventing.

As fats are good solvents for these lipoids, practically all fresh fats, such as butterfat, olive oil, lard, corn oil, coconut oil and cotton-

seed oil, can be activated, often to a degree to make them compare favorably with cod liver oil. As antirachitic action consists in the induction of calcium assimilation and its conservation for the animal, this is a matter which concerns not only the young, but also the adult.

The authors suggest that these findings may have their significance not only in nutrition, but also in the therapy of those diseases known to respond to irradiation with ultra-violet light.

## BOOK REVIEWS

**International Clinics.** Vol. I. Thirty-fifth Series. Edited by Henry W. Cattell, A. M., M. D., Cloth. Price \$2.50. Pp. 301, with 53 illustrations. Philadelphia: J. B. Lippincott Company, 1925.

The contents of the text is divided into six portions: (I) *Professor Barker's Medical Clinics*, (II) *Diagnosis and Treatment*, (III) *Mental Disturbances*, (IV) *Surgery*, (V) *Toxicology*, and (VI) *Progress of Medicine for 1924*.

I. The volume opens with two clinics presented by Professor Barker. In the first case of *staphylococcus septicæmia*, complications arose resulting in meningitis, septic embolie pneumonia and nephritis and thrombophlebitis in one leg. The general progress of the patient is noted and the principles of treatment of general sepsis are considered. In the second clinic, the author considers the *treatment of the psychoneuroses and of the milder forms of the psychoses*. He considers (1), those who can be cared for at home, and (2) those who do very well in the public or private ward of a hospital.

II. The division of Diagnosis and Treatment opens with an exposition on *group medicine* by Charles D. Lockwood. Very fully does he detail its advantages and disadvantages, and determines that the essential factors in group diagnosis are not only a capable leader and a working agreement with specialists, but well equipped x ray and clinical laboratories.

C. Judson Herrick presents *some relationships of the visceral nervous system*.

The next two articles are written by Thomas M. Dorsey, in conjunction with Rudolph Monaco and Frank C. Bohannan, respectively. In the first article, the author considers *some of the urologic problems most frequently encoun-*

*tered in daily practice*, placing particular stress on the difficult eradication of gonorrhea. In the second, the subject of *pyuria* is discussed, with special reference to the causative factors.

Frederick Christopher carefully reviews the literature on the *surgical diseases of Meckel's diverticulum* and reports a case on diverticulitis with perforation.

Arthur Van Harlingen discusses and illustrates the condition known as *eczemaform ringworm*, stressing its diagnosis and methods of treatment.

The article entitled *Macrobiotic and the Goddess Hygiea*, contributed by Charles Greene Cumston of Geneva, Switzerland, criticises the medical men who work out these theories of an apparent scientific dress to tranquillize their minds when confronting old age and death.

III. The subject of Mental Disturbances is introduced, with some *remarks on the psychology of paranoia* presented by Edouard Retif.

A very interesting case is presented by Ralph C. Hamill to illustrate the subject of *amnesia and pathological stealing*.

Alfred Gordon discussed the biological and psychological aspects of the *psychoneuroses in relation to general medicine*.

IV. To introduce the subject of surgery, W. Wayne Babcock presents three cases to illustrate the seriousness of small *penetrating wounds of the skull; by an automobile bolt; by a carpet tack; and by a penknife*.

Max Thorek carefully discusses a *new and effective method of treatment of chronic suppurations, especially of bones*. His plastic dressing of aluminum-potassium nitrate by its bactericidal action produced wonderful results in the series of 119 cases presented. Convincing illustrations accompany the article.

J. Clarence Keeler stresses the *early diagnosis of mastoid diseases by the general practitioner and the postoperative care of the patient after leaving the hospital*.

*Malformations of the anus and rectum* are conditions that are only occasionally seen, but should receive immediate surgical attention. The embryology, diagnosis and treatment of these malformations are carefully covered by Charles J. Drueck.

L. Wallace Frank cites four cases of *acute osteomyelitis*, stating that in each case mercuriochrome should be administered at once

without waiting to see whether the blood culture is positive or negative.

I. A. Lederman presents his *observations on intranasal lesions*.

V. The division on Toxicology contains only the article by Hubert Blane on *death from tobacco*, who notes that death only results when arterial changes are very advanced, usually after the age of sixty, and suggests its discontinuance when cardiovascular lesions are suspected in those in advanced years.

VI. The Progress of Medicine for 1924 is reviewed by Henry W. Cattell and James F. Coupal who, after noting the historical medical occurrences for this period of time, carefully arrange all advancements in a summarized encyclopedic form.

For the busy practitioner who finds it impossible to attend occasionally the clinics held in the various medical centers and who wishes to keep abreast of the times, no other avenue is open except to subscribe to one or two general medical journals and one or more special medical journals and to obtain a volume, such as the *International Clinics*, published quarterly, which presents clinics by the most prominent teachers and clinicians in this and other countries.

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**The Electrochemical Factor in Neurology,**  
by Ernest H. Pasque, Vice-President Atomic Research Association, and **New Concepts of Physics**, by Calvin Samuel Page. Cloth. Pp. 604, with 25 illustrations. Chicago: Atomic Research Association, 1925.

This single book, containing the cream of two of the foremost of scientific minds, deserves the earnest consideration of every conscientious and open-minded student of physiology, biology or any of their allied sciences. Surely, it should receive the most careful study by those employing physical principles in combatting disease.

The author of the first book, after briefly reviewing the accepted fundamental theories of electron activity, constructively organizes his evidence so as to paint a comprehensible picture of the electrobiological functions of the electron actions and their electrochemical connections with the functioning of the human organism and neurology in particular. The writer begins with the fact that particles consist of electrons which move with tremendous velocity and are continually intercepted in their course by other components of tissue. This motion is produced by electric and mag-

netic properties, constituting an electromagnetic field, possessing static charges. Electrons compose all matter, so that atoms are each composed of a definite number and possess definite properties thereby. The author interestingly proves the most intimate relationship between x rays and the electron—either the manifestation of the other. This same train of scientific reasoning is woven into the interpretation of the electrochemical action of proteins and the individual cells of functional activities differing from the primary atomic structure and the electromagnetic condition of the movement, are the causes of nerve development. The physiology of the nervous system, both general and specific, is discussed at length and the same fundamental and conclusive statements are carried throughout. Truly, the open-minded student of physiology and biology is being offered an essential and practical knowledge of electrochemistry and its relation and action in neurology which will be of inestimable value in the scientific application of the principles are used in the treatment of disease.

In the second portion of the text, the much-discussed Rx is elaborated upon. This term is comparable and interchangeable with the *electron* stressed in the first portion. In either case, they are the energy or power which holds the atom in molecular combination. The author in this volume embodies the essentials of the Atomic Science and outlines the possibilities of this new science. These new concepts as offered by the writer render a foundation for the satisfactory and scientific explanation of all abnormal and normal activities. An understanding of Page's Concepts offers a logical foundation for the preceding work, and equips the practitioner to judge the value of the various therapeutic principles employed.

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**International Medical Annual.** A year book of treatment and practitioner's index. By 31 Eminent Specialists. Edited by Carey F. Coombs, M. D., F. C. A. P., and A. Rendle Short, M. D., B. S., B. Sc., F. R. C. S. Octavo. Price \$6.00. Pp. 566, with 43 plates and 87 illustrations. New York: William Wood & Company, 1925.

This compact text, arranged in encyclo-

paedie form, contains the cream of medical achievement. To the general practitioner, who conscientiously attempts to keep abreast with the progress of medicine in its several branches, this review of the year's work in the treatment of disease presents an indispensable thumb index. By referring to the subject in question a hasty review of the recent advancements may be readily obtained and indications given for further detailed study.

Radiologists should be particularly interested in the entire contents of such a concise index of facts. Throughout the text, in the consideration of the individual diseases, recognition is given, wherever practical, to the value of the x ray for diagnostic purposes and for the entire category of physical measures when indicated in the treatment of disease.

As an individual unit, the general subject of *Radio-Activity and Electrotherapeutics* is handled by Chas. Thurstan Holland, Lecturer on Radiology at the University of Liverpool, under two headings: (1) Radiotherapy, and (2) X Ray Diagnosis. Under the subject of Radiotherapy the question of *massive dose* is considered at length and the observations made through individual experimentation both at home and abroad are carefully noted. Concerning the *effects of radium and x rays on tissues*, brief reviews are given of the various investigations made during the last year. The works of Case, Lazarus-Barlow and Knox are considered in attempting to determine the advance of *deep x ray therapy*. *Radiation dangers* have occupied a great place in the roentgenologic literature and much has been done toward the alleviation of this great therapeutic handicap. The diseases considered by the author include *pulmonary tuberculosis* treated by irradiation of the spleen and by the deep therapy method, *laryngeal tuberculosis*, the treatment of *lupus of the nasal mucous membrane* and *pertussis*, indications for roentgen therapy in *tonsillar disease*, *keloids* and *interstitial keratitis*, *actinomycosis*, *carbuncles*, *hyperthyroidism*, *prostatic hypertrophy* and *carcinoma of the prostate*.

The subject of X Ray Diagnosis is considered by systems. After a preliminary discussion of the recognition of the importance of the roentgen ray as a clinical entity and its establishment as a separate and requisite department in various medical curricula, the author stresses the importance of the roentgen ray in the diagnosis of diseases of the *digestive organs*. The question of the establish-

ment of a diagnosis in the various diseases of the *lungs* is greatly facilitated by the roentgen ray. The reviews offered on this particular phase are very illuminating. X ray examination of the *urinary tract* is limited to the consideration of calculi and pyelography. During the past year great advance has been noted in *obstetrics* with the development of an adequate technique to authorize the establishment of the roentgen ray as a diagnostic aid for the determination of pregnancy. Reproduction of roentgenograms which have aided in the diagnosis of twins help in establishing the adequacy of this measure. The roentgen ray has, since its introduction to the medical profession, been used in the diagnosis, noting the progress of treatment and in the prognosis of diseases of the *bones and joints*. Even in this, its initial medical usefulness, great advance has been made in the past year.

And for those who wish to follow up the numerous reviews cited, and to expand upon their medical knowledge, authors have included throughout the entire volume itemized references.

**Experimental Rickets.** The effect of cereals and their interaction with other factors of diet and environment in producing rickets. *Edward Mellanby*, Professor Sheffield Medical School, Medical Research Council, Special Report Series No. 93, Paper. London, 1925.

The Medical Research Council issues another report on experimental rickets. The basis of this report is the work by Professor Mellanby, who in another way substantiates the work done by Hess and co-workers in America by activating inactive foods by ultra violet radiation.

Having come to the conclusion that rickets from the deficiency of the vitamin analysis reveals the highest degree of this vitamin in cod liver oil, a moderate amount in egg yolk, butter and milk, and an almost total absence in cereals, vegetable oils and meats. These deficient foods also, particularly the cereals, have a detrimental effect on bone formation. Of these cereals, oatmeal has the worst influence on bone formation, barley rice and maize a less harmful effect and wheat and wheat flour the least harmful effect. Radiating these cereals produces food endowed with distinct antirachitic properties. For this reason the author concludes that cereals are antagonistic with ultra violet irradiations and cod liver oil.

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